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'Knowledge is proud that he has learned so much,
Wisdom is humble that he knows no more.'—COWPER.

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The Teacher's Health.

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DIGESTION cannot be performed in a healthy manner if the requisite means are not taken—(1) To provide the stomach with proper food to digest; (2) to digest that food; by the aid of perfect mastication, of healthy saliva, and of proper gastric juices; and (3) to remove the *débris* which remains after absorption of the portion thereof not wanted by the system. I have already pointed out the character of the food which nature requires, and have given some general instructions as to the necessities of healthy digestion. We will now look at the subject from another point of view. See how keenly those children enter into the excitement of their games, in the field or playground. See how restless those little ones are, in the schoolroom—how impossible it seems to be to keep them still; how difficult it is to fix their attention upon the single subject which the teacher is wishful to inculcate; how little the teacher is fit for his duty when he scolds them for inattention, and punishes them for wandering from the subject before them. The right principle for the teacher to follow is to seize hold of the natural instincts of the child; not to threaten it, but to use the restlessness itself as a means whereby education should be forthcoming. A child's constitution is a thing which cannot be kept like a bow bent for long in one direction without injuring it. Nature dictates to us that muscle must be continuously exercised if it is to be well developed; that muscles which are not continuously used whilst the child is awake are not properly developed, and lose some of their natural power; that children must have their muscles tired out if they are to be kept quiet. I ask teachers to refer to the anecdote mentioned in page 97 of the volume on 'Health at School' (where physical exercises are considered), and if they will study the indications which that anecdote affords, they will better understand how restlessness and inattention must be dealt with, if they wish to preserve order and regularity in the school hours, as well as in the dormitory. If we experiment upon two brothers equally strong or equally weak in a similar manner as regards everything else except the work to which each is put, we may gather much information. The one sits upon a stool all day, doing some trivial work with his fingers, whilst the other is instructed in the mysteries of the blacksmith's anvil. At the end of a twelvemonth there will be a marked difference between the muscular developments of the two. The arm of the one will be many inches more in circumference than the other. The biceps of the blacksmith will feel hard and tense, that of the other soft and flabby. Regular and steady work has led to a great increase in the power and size of the muscle, has developed new cell-growth in its tissue, and has cleared away the cell-fibres which have been used up in bringing out muscular power. Besides increased development, continuous work in the end produces healthy fatigue. A muscle, however, cannot be kept in use too long without mischief resulting, such as is shown by the diseases called *writer's cramp* or *scrivener's palsy*. There must be time for rest; during that rest repair takes place, and *débris* is taken away from the muscle tissue by the absorbents. The natural fatigue which results from wielding the sledge-hammer produces sleep which is sweet and refreshing, and at the same time sets up a demand for food, which makes a blacksmith's appetite something positive. To wield the hammer as a blacksmith does, brings into play a series of muscles, all of which partake of the feeling of fatigue, and lead to the urgent necessity for rest, and at the same time to a demand for nutrition. The mischief which results from harping upon one string, and working a single muscle for too long a period, as in writing incessantly, is often serious: the repair is interfered with, some *débris* remains behind, and the nerve which is distributed to the overused muscle is irritated by the refuse matter, and a painful spasm results, or a loss of power follows, leading in the end, it may be, to actual palsy. Muscles must be also equally exercised, otherwise there may be mischief. If a limb is damaged by the division of its nerves, in consequence of which the power of muscular movement is lost, the muscles at the time of injury being in a perfectly healthy state: they soon lose their tone, become more and more flaccid, and in course of time are changed into a series of fat granules, which become deposited in the muscle cells in the

place of healthy muscular fibre. There are changes taking place in a muscle which will in time alter its character, and take away its contractile power. If its function is not regularly performed, the old muscle cell elements decay, and their skeletons are not removed as they ought to be, but they enclose minute grains of fat in place of muscle cell; no new muscular tissue is formed, the *débris* continues *in situ*, and the call for nitrogenous matter, to repair the waste of tissue does not arise, and there is a loss of appetite as well as loss of power. If muscle is not used, or if more food is taken than is required for its repair, there is a development of more or less fat in all the organs of the body, not only in the muscle cell, but in layers around the organs. Instinct generally leads the child to make muscular movement, and hence the intensely restless character of the majority of children. If they are quiet for any length of time either from thinking too intensely, or being heavy and listless, there is a retention within the system of used-up matter, which is ready at hand to produce illness or allow of the easy introduction of infectious disease, should the germs capable of setting up that class come into contact with the mucous membrane of the individual in question. Those who are not properly exercised are more prone to take on infectious maladies than those who are always in the open air, exercising their muscles, and getting rid of used-up material as fast as it is formed.

The principles thus inculcated should guide the teacher as to the means whereby he will be able to keep himself in health as well as the class which is under his care. Without muscular exercise he cannot keep himself in health, and without exercise he cannot bring out the muscular sense (properly so called). This sense sometimes called the sixth sense, is necessary for the proper guidance of muscular movement. There is, to some extent, an association of this sense with that of sight, but its own perfection is brought about by exercise, and it is to its manifestation that the delicacy of touch is rendered serviceable, and the great masters in athletic sports, at the rifle-butts, and in the use of stringed instruments, etc., are made. This muscular sense is probably presided over by a particular part of the brain, but just as the blacksmith's biceps develops by active use, so the seat of instinctive muscular finesse is increased in power by its continuous activity at regular intervals. Character is sometimes read by the aid of the copybook; the form of the letters will guide the expert as to the nature of the writer's brain-power, and enable him to conclude that there is unequal development, and therefore a chance that its balance may be interfered with. It tells us that there is inequality. It is the duty of the teacher to counteract this tendency, and to see that each organ is exercised in rotation, and that one part of the brain, or one part of the muscular system, shall not be developed at the expense of the other, but that the principal divisions are brought out in order. If the muscular sense is lost the proper action of the muscle can be no longer regulated; if it is not used the feeling of fatigue which is necessary for healthy slumber is not forthcoming. Our notions of space and distance are dependent upon its proper exercise, and even the ordinary work of doing nothing involves the use of this sense. To some extent Nature has not left us entirely to our own free will in the matter, but those parts of our nature which are brought out by vegetative life are very small compared with those for which a free will is required—a free will on the part of the individual or of some person to whom the individual is willing to render the service of obedience. It is necessary to fatigue the muscles to a moderate extent for several reasons.

(1) Exercise produces a greater freedom of circulation, by means of which the blood is hastened in its current through the system, and exposed more frequently to the vivifying action of the atmosphere in its passage through the lungs.

(2) It produces a greater demand for carbon compounds, and thus promotes a healthy appetite.

(3) It increases the equality of the animal heat by promoting the combination of carbon with the oxygen, by means of which carbonic acid is formed in the blood, and the temperature kept at its normal standard.

(4) It increases the evaporation of liquid from the skin and lungs, by means of which there is increased desire for water. The water taken into the system dissolves the salts which have been formed in the process of renovation of tissue, and which should be carried away to the various emunctories and expelled from the system.

(5) It promotes a desire for rest and sleep, and enables the absorbents to be at work in the renovation of nerve matter—an operation which cannot go on in its proper manner whilst the brain is awake. Sleep is, therefore, necessary for brain repair, and sleep to be of the proper kind must be preceded by muscular fatigue.

There is a sleep which is caused by over-fulness; it is brought on by indulgence in the pleasures of the table, besides another kind which is promoted by narcotics. That sleep is a delusion and a snare. It may allow the muscles to rest, but it does not allow the brain to be freed from its refuse matter; it is followed either by dulness or headache. Any teacher who flies to narcotics or stimulants for the purpose of obtaining sleep is knocking a nail into his coffin, and hastening the end, instead of travelling on a road which leads to health.

Excessive muscular strain, especially that which arises from the strain being kept up on one muscle or one set of muscles is to be deprecated. Those who have danced all night when they have been unaccustomed to that kind of exercise, are like Goldsmith's pair that 'simply sought renown, by holding out to tire each other down,' and paid for it the next day by frequent attacks of cramp in the muscles of the calf of the legs, which conclusively proved that they had overtaxed their strength, and had damaged their muscle by interfering with its recuperative powers. Every kind of exercise, if it is to be beneficial, must be regular, not carried out by fits and starts. A man who walks twenty miles on a Sunday, and only one each other day of the week, is intemperate, and suffers in consequence; just as a man who drinks a bottle of wine on one day of the week, and only a glass on each of the other six. He will probably be a drunkard, whilst he who takes double the quantity of wine in the same time is looked upon as a jolly good fellow, and does not come to harm from its use in anything like the same length of time as the other. Training for the development of muscular power, and for the perfection of the muscular sense, must not, therefore, be carried on for an excessive length of time; it must be regular day by day: spurts are to be especially avoided as liable to bring on conditions which tend to weakness rather than the contrary. They are often the foundation of

disease which develops some time afterwards, especially that affection of the blood-vessels which is called aneurism, in which a vessel being inordinately strained, gives way in its inner coat to the slightest possible extent, and like a roof of a house in which a tile is loosened, each successive tempest increases the damage, until the house becomes uninhabitable. The vessel gives way, and death immediately results.

Sleep.—'Blessed is he who first invented sleep,' a saying of Don Quixote, paraphrased by 'Lord Dundreary,' as if it was something new. 'Tired nature's sweet restorer,' how often has it been courted by the teacher, and how it has fled from his embrace. First and foremost in the struggle for sleep is the necessity that exists for regularity in trying to obtain it. Habit is a very important factor in its production. It is quite immaterial as to the time at which it is obtained, provided it is encouraged at one particular hour. No doubt the natural time for healthy sleep is soon after sundown and before sunrise, but civilization is opposed to nature, and all our gregarious arrangements tend to throw its acquisition nearer to the time of sunrise than sunset; but no sleep will be so satisfactory which is not sought for at one particular hour in the twenty-four. I urge, therefore, that a man should contrive to go to bed as near to the same hour as possible, whether he is sleepy or not. It is not wise to encourage sleep when the stomach is full, unless the strictest rule has been followed as to quality and quantity, and also that the fatigue is that which exercise has produced. In that case we may imitate the animals, and go to sleep whilst digestion proceeds, especially if the teeth are perfectly sound, and mastication of food has been duly performed. Those who have not good grinders will be wise to walk a little after the last meal, before retiring to rest; and never go to bed with cold feet. Cold feet mean more blood at the other end of the body than is consistent with healthy sleep. Fresh air is also necessary, the purification of the blood goes on during sleep as well as during wakefulness; the discharge of carbonic acid is not so continuous as during the waking time, and the presence of impurity in the bed-room, by diminishing purifying action, still more promotes a condition which leads to wakefulness.

(To be continued.)

How I Teach Latin.

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(Continued from page 69.)

HAVING by this time built up our Etymology, and through the aid of short sentences, learnt the principal rules of Syntax, we are in a position to attack some continued history or poem. Before doing the latter, it would be necessary to lay down certain rules of Prosody, such as the general rules as to the length of vowels and the scanning of hexameters and pentameters. The other metres may safely be left for a considerable time. On the teaching of these general rules of Prosody I purpose treating in the next and concluding portion of this essay.

I do not approve of Cæsar's Gallic War as a good first book, unless, as has been done, the speeches be translated into the 'oratio directa.' A whole chapter will sometimes only contain one indicative mood; and this is very puzzling to beginners, to say nothing of the constant introduction of the subjunctive mood, which has to be translated by an indicative. No doubt Cæsar might be used as a class-book leaving out the speeches, just as Greek plays are often read without their choruses and lyric portions, or even Thucydides without his speeches; but such a method almost teaches a pupil to do that very thing which the aim of all good teachers is to prevent, viz., to lose sight of the work as a whole and a study in itself. Too many young people are so taken up with the constructing each sentence that they scarcely connect two sentences of their work together, and can give but little account of the history or story they have been reading. As an illustration of my meaning, I have no hesitation in saying that a class of fourth form boys would know less of the facts of a gospel studied for examination purposes in the original Greek than a younger class would, who had prepared the Gospel in English. It is therefore most desirable that pupils, if possible, should learn a work, or a portion of it, as a whole or entire extract, and that they should realize the history and the meaning of it, just as if they were preparing a portion of history or a drama written in their own language.

Phædrus' version of Æsop's Fables, excepting the prologues of the books and morals of each fable, which are often quite difficult, is useful no doubt for teaching purposes, as, in spite of what has been said above, the interest of the fable lures the pupil on to the end; but they have this objection, that they are written in verse, and that, too, not one of the better-known and more easily-learnt Latin metres, to grasp the scanning of which they are not able. Eutropius, as edited by Dr. White, with his exceedingly good vocabulary, is a very good first book, as it contains scarcely any oratio obliqua, many participles and ablatives absolute, besides a constant use of the relative pronoun, generally accompanied with the indicative, but sufficiently often with the subjunctive to begin to accustom pupils to expect verbs in the subjunctive mood where we use them in the indicative. Whenever a relative pronoun begins a sentence, especially when followed by 'quum,' with the plup. subjunctive, the pupil should be taught to resolve it into its constituent parts of a conjunction and a demonstrative or personal pronoun. The literal translation of Latin idioms should be given as well as their corresponding English ones, and on no account should the derived English word be allowed to be given as the translation of a Latin word. There are a few old-fashioned rules for translations which are only too often forgotten, but which must be insisted on in the attack of every sentence, whether principal or subordinate: First, find the verb, and see if it be singular or plural; then look for all the nominative cases, singular or plural as the verb may indicate, whether adjectives or substantives, and take care that they either form the subject, or are one with the subject. Next, find the object if the verb be active, and lastly, let the genitive cases limit nouns that come after them—if there be such nouns. With these few rules persistently applied to every sentence, it is wonderful how the most complex sentences gradually

become thoroughly apparent and easy. It is good to alternate prose and verse. Ovid's 'Heroides' being short and complete in themselves, it is better almost to begin with them than Virgil, or Ovid's own marvellous 'Fasti.' I know Cicero or Livy is generally introduced as the second book of prose before Sallust or Tacitus, but I cannot help thinking that this is a mistake—certainly with regard to Sallust, if not to Tacitus. Livy's and even Cicero's sentences are, many of them, very long, and though no doubt something has to be supplied to translate Sallust into intelligible English, still, I believe that the ordinary pupil soon grasps the gist of Sallust, and, having done so, it becomes a useful English exercise for him then to fill in that which seems to be wanting in the Latin form to make good English. And after all, what are the main uses of learning the Latin language at all? Many people would say, Why spend the time you do on a dead language? why not devote the time to the modern languages, or even to your own? The answers are many, and one is, that it is far easier to teach a language like our own with the aid of such languages as Greek and Latin, than it would be if we tried to teach it by means of our own grammar, and even by studying our own classics; but there is another, and that is, that our teachers do not at present begin to know how to make English an educational subject, as they know how to use Latin and Greek; nor, until very recently (and even now to a very limited extent), had they any text-books to give their pupils.

Just compare, for a minute, our facilities to treat a book of Virgil's Æneid, or Livy's Histories, with our dictionaries (giving a history almost of all the more important works), with our grammars culled from the continuous labours, experiences, and deductions of nearly 2000 years; with our commentaries written, originally, in all languages, under all circumstances, and those which we have to bear upon a play of Shakespeare or a tale of Chaucer. True, much is being done, and who can tell but that in time things may be different? but now, what English Dictionary would take the place of our 'Andrews'? What commentary on Shakespeare is there that gives us what Munroe, or Codrington, or Mayor, does on the principal Latin classics? Just compare the modern notes on a play of Shakespeare with those on a Latin author, and any one would immediately see how much more is known about the one than the other, and how much better therefore the one will act as a means of education than the other.

But in addition to this, the translating classical authors of all languages cultivates the polishing of our own language, and, no doubt, many a classical scholar improves his place in an examination by the elegance of his own English, and that a 'good classic' may, as far as that part of the examination consist, often be a man who knows no more Latin than his fellow far below him, but who is a better English scholar.

(*To be concluded in our next.*)

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Lessons in English.

BY ALEXANDER BAIN, LL.D.

IX.—EMOTIONAL QUALITIES OF STYLE.

THE examples in the present lesson will be devoted mainly to the sublime of natural scenery. The conditions of success in this effect will be to some extent illustrated.

The emotions of sublimity, or the highest form of strength, have been referred, in a former lesson, to the fundamental feelings of Maleficent and Beneficent Power. It may now be added, that Personation is more or less implicated in the effect. Our strongest emotions refer to persons; and the occasions of their strongest manifestations are in the encounter with actual persons. Love, admiration, anger, hatred, contempt, are drawn forth in their utmost degree, by some one or more individuals in personal relation to ourselves. Even our sense pleasures or pains are most strongly brought out by the sensible qualities of living beings.

Poetry, or emotional composition in general, must fail to rival in effect the presence of the living beings that actually surround us; no description of any object whatever can equal the reality. But poetical or other description has resources and arts that help to compensate for its deficiency in the power of making us feel an absent thing as if it were present. There is not any art that can give the impression of the Parthenon, of St. Peter's, or of Mount Etna in volcanic activity; but there are resources, both in poetry and in painting, for arousing in us very vivid emotions in connection with all of them.

In our feelings and pictures of Personality, there is this peculiar circumstance, namely, that the smallest, the most limited, resemblance to a person can rouse the personal emotion, so far as that feature goes. We do not need a completed personality in order to be reminded of our relationship to persons. A picture comes very far short of a living man or woman, and yet it can stir up in us a considerable force of the personal emotions. So can a statue, which has its peculiar advantages and disadvantages as compared with a picture. Both are inferior to reality; but both may do something to make up for their inferiority; that something being the triumph of art. By giving increased prominence to some salient and leading peculiarity, perhaps the one that gives the original its chief interest, by subduing the uninteresting or unimportant features, an artist can make us take more interest in a mere picture than we do in an original. Even when we are looking at an actual man, or woman, or animated object, we are not necessarily occupied alike with all the parts; some one feature engrosses our attention; and if, in a good imitation, this feature is improved upon, we may prefer the work of art to the actuality.

So penetrating is our sense of personality, that we are laid hold of by any single circumstance of resemblance, even in things that have nothing else in common with an actual person. The chance outline of a mountain may resemble a human face; we take a personal interest in the resemblance; while the gigantic mould and

proportions elevates our conceptions, in the way that we feel when contemplating a giant. Anything that manifests great power—as a rushing stream, a tempest, or a steam-engine—makes us agreeably alive with the sympathy of power, as if it were a personality like ourselves, and yet there is wanting everything else that makes up personality

On the foundation, thus briefly sketched, nature-interest takes its rise; while the painter and the poet build upon it without end. The conditions of their success are to be judged by the study of examples.

Our present lesson will start from Coleridge's "Mont Blanc."

> Hast thou a charm to stay the morning star
> In his steep course? So long he seems to pause
> On thy bold awful head, O sovran Blanc!

The Apostrophe and Interrogation are finely employed as the setting of the lofty phraseology. The ingenious fiction contrived to insinuate the vastness and potency of the mountain is what we can tolerate; the morning star is arrested in his rise by proximity to the summit. This little fiction is expressed in agreeable terms, but without strain or elevation; so that we are prepared for the highly-pitched language of the third line: "thy *bald awful* head"—a fine combination; the one epithet giving picturesque description, and the other emotional force. There is still room left for the third epithet "sovran," at once appropriate and effective. As an introduction, we can conceive nothing finer than these lines. Their melody is in full keeping with their language.

> The Arve and Arveiron at thy base
> Rave ceaselessly; but thou, most awful form!
> Risest from forth thy silent sea of pines,
> How silently!

For a great effect, Contrast is felt to be indispensable, or at least an important aid. Yet the management of a contrast needs delicacy; we must not make the contrasting picture intrinsically disagreeable, while heightening the main subject; and we must be sure that it really adds to the effect. Coleridge is bent now upon setting forth the majesty of silence, with its associations of dignity, awe, and solemnity; and he looks about for a contrasting noise that shall be free from indignity or vulgarity. He finds this in the two great glacier streams, which are the appendage of the mountain, and belong, therefore, to its full delineation. They are vehement, noisy, restless; yet the vivacious energy of a running stream makes an object of nature-interest, through a dim but felt personification; and it is one of the standing constituents of nature poetry. The poet gives it the touch of ideality in his epithet "rave." "Rage" is hacknied to weakness; "rave" is not unlike the situation; it is not a pleasant idea applied in its original signification to a human being bereft of sober sense; but we learn to surmount the unpleasantness in the metaphorical application to insentient nature: we thus receive it, as it is meant, to suggest force or vehemence, which has an animating and elevating effect by the law of sympathy extended to the physical world.

Now comes the contrast. We have first the repetition of the term "awful," which belongs to the sublime in its most efficacious form of destructive possibility; the extreme harshness of this idea being toned down by usage, but the essential part remaining. Next comes the fine, and yet simple, line—"Risest from forth thy silent sea of pines." Still-life form is made more impressive by action, although fictitious. The mountain is made as it were to *rise up* to its great elevation. The "sea of pines" is a powerful delineation of the grandeur of the lower vegetation: the epithet "silent" is a fine personification of quiet. The idea of "silence" is repeated in a brief closing exclamation—"how silently!"

This is all that the poet thinks proper to make of the mountain itself as a visible object. He selects three impressive circumstances and no more. He might have given the reader farther assistance in the way of conceiving the actual mountain; in this respect, however, poets have a wide latitude. They attempt too much if they endeavour to play the part of the descriptive geographer, or picturesque tourist, and to give a reader of lively imagination the full conception of a complicated scene. Yet they are often successful in seizing leading features with such power as to contribute greatly to make an absent object vividly present. Whether Coleridge might not have made something more out of the surroundings of the mountain, we do not venture to judge; as it stands, the reader would need to have seen the original to be fully affected by the beauty of the description.

The next lines present a new aspect.

> Around thee and above,
> Deep is the air and dark, substantial, black,
> An ebon mass: methinks thou piercest it,
> As with a wedge!

We can remark here upon the very perfect arrangement of the words, showing none of Gray's vacillation. We might try any number of variations, but we could not improve upon the present order. "Around thee and above" comes first in the presentation of the picture, although in grammatical prose order it would be last or nearly so. The inversion "deep is the air" goes as far as it ought, and no farther. It would not be an improvement to make the whole series of adjectives precede the noun "air." These adjectives are cumulative, and run to a height in "black," while the "ebon mass" makes the climax. The towering height of the mountain is

rendered impressive by the powerful delineation of the altered atmosphere depending on height. Every word tells; "deep" is appropriate to the rarity of the air making it, as it were, more penetrable; in such a connection, it has the touch of sublimity of space; the darkness, substantiality, and blackness, present a different aspect, the absence of clouds and light reflection, also an incident of great elevation. It requires some experience of the lofty heights of the atmosphere, to feel the effect intended. The solidity is still further enhanced by the closing circumstance—"thou piercest it as with a wedge." Everything is done to put us in an entirely new atmospheric situation, so as to suggest the more effectually the far-reaching elevation of the mountain summit. The poet must intend, however, that we should conceive the air, as it would appear, if we were actually on the top; for looking up from beneath, we should fail to recognise it. The whole idea is intrinsically grand, but wants to be reflected on; which is not what is usual, or indeed advisable, in poetry.

> But when I look again,
> It is thine own calm home, thy crystal shrine,
> Thy habitation from eternity!

Once more we change the point of view. The impenetrable depth of the air is now converted into the home, the residence, of the mountain; a pathetic circumstance that softens the stiff grandeur of the previous situation. The addition of "thy crystal shrine" no doubt adds to the poetry, by the combination of brilliancy and sacredness, but it strains our imagination to make it unite with the depth and blackness, already depicted. The addition of "eternity" raises the sublimity to the utmost; but the want of truth (on every theory of the universe) is disenchanting.

> O dread and silent mount! I gazed upon thee,
> Till thou, still present to the bodily sense,
>
> Didst vanish from my thought; entranced in prayer
> I worshipped the Invisible alone.

The poet delights in iterating the circumstance of silence and calmness; the sublimity of the picture reposes upon energy in reserve; self-contained majesty, realising the ancient philosophers' conception of the pagan gods. Without might in some shape or other, nothing could be sublime; certainly "dread" supposes power; and the obvious way of manifesting it is by action; as in the ocean, the waterfall, or the tempest. When we are sated with the tumultuous displays of power, we can recur with satisfaction to the quiescent attitude, although we must still suppose the existence of the force. In a mountain we can well imagine the energy of upheaval, and also the crushing pressure upon the ground beneath; but these are not brought out by the poet, except in his phrase—"risest from forth thy silent sea of pines"; no accompanying might is suggested in the rising.

The final circumstance is the religious turn given to the contemplation of the mountain. The thought is pantheistic; that is, the Invisible God is somehow imagined as a transformation or equivalent of the scene; not as the maker or creator of it. The propriety and effects of this vein of reflection cannot be judged by the same laws of criticism as the rest.

We have the great advantage of comparing Coleridge with Shelley on the same subject. The "Lines written in the Vale of Chamouni" make a poem of six pages, in Shelley's usual style of diffuse and gorgeous illustration. Luckily there is one short passage that we can bring into comparison with the Coleridge passage.

> Far, far above, piercing the infinite sky,
> Mont Blanc appears,—still, snowy, and serene—
> Its subject mountains their unearthly forms
> Pile around it, ice and rock; broad vales between
> Of frozen floods, unfathomable deeps,
> Blue as the overhanging heaven, that spread
> And wind among the accumulated steeps;
> A desert peopled by the storms alone,
> Save when the eagle brings some hunter's bone,
> And the wolf tracks her there—how hideously
> Its shapes are heaped around! rude, bare, and high,
> Ghastly, and scarred, and riven.—

The far-rising top, piercing the sky, is given as in the other. The silence is less emphatically expressed, and the awe or dread is absent. The baldness is replaced by the less effective epithet "snowy." Instead of rising from the pines, the poet chooses a circumstance equally impressive, and even more picturesque—the surrounding of the subject-mountains with their unearthly forms of ice and rock. Perhaps Coleridge would not have omitted so striking a feature, if he had not been anticipated. Implicated with these forms, and filling up the picture, are the vales where the glaciers descend—"frozen floods, unfathomable deeps, blue as the overhanging heaven." This aspect is grandly filled up with suitable circumstances, in good proportion, and without those serious digressions or detractions, which so often mar the coherence of Shelley's descriptions. We can afford the little incident of the eagle and the wolf, without losing our thread. The reflections that follow the above are less satisfactory. There is a mixture of strong language with moralising, in which neither comes out so plain and straight as we could desire.

> Is this the scene
> Where the old Earthquake-demon taught her young
> Ruin? Were these their toys? or did a sea
> Of fire envelope once this silent snow?
> None can reply—all seems eternal now.
> The wilderness has a mysterious tongue
> Which teaches awful doubt, or faith so mild,
> So solemn, so serene, that man may be
> But for such faith with nature reconciled;
> Thou hast a voice, great Mountain, to repeal
> Large codes of fraud and woe; not understood
> By all, but which the wise, and great, and good
> Interpret, or make felt, or deeply feel.

The first interrogation—"Is this the scene where the old Earthquake-demon taught ruin

to her young?"—is a grand similitude worthy of the poet. The next theory put as a question—"Did a sea of fire envelope once this silent snow?"—divides our attention; we do not know whether to take it as a scientific hypothesis, or to view it as poetry; it does not rank high in either case. The remark "all seems eternal now" is juster than Coleridge's past eternity. The concluding scepticism is too hasty; and is not atoned for by the poetry. Such sweeping conclusions are not to be drawn poetically.

This lesson may end with an example of the licence of personification, taken from a different subject, namely, personality in the actual, but carried beyond human limits. There is gained here also the advantage of rising far above our own familiar selves, and seeing the qualities that we delight in contemplating raised to preternatural dimensions. The mind can be satisfied, pleased, and elated, by a grand stroke of power, with a very dim conception of the powerful personality in its other features. Upon this specialty of our imagination, Milton has reared the structure of the *Paradise Lost;* in which he follows innumerable precedents in the poetry of the mythological ages. We are quite unable to realise the complete picture of Satan, or of any of his host; except when they are supposed, by way of disguise, to take on the literal human form; yet the gigantic scale of their actions makes a pleasing conception of a favourite passion—the passion for power, whether in exercise or in thought. The operation involves risks of failure, and it is the office of critical laws to warn against such.

Let us quote the grand passage from the First Book, where Satan rallies his fallen host.

He scarce had ceased, when the superior fiend
Was moving towards the shore; his ponderous shield,
Ethereal temper, massy, large, and round,
Behind him cast. The broad circumference
Hung on his shoulders like the moon, whose orb
Through optic glass the Tuscan artist views
At evening from the top of Fesolè,
Or in Valdarno, to descry new lands,
Rivers, or mountains, in her spotty globe.
His spear—to equal which the tallest pine
Hewn on Norwegian hills to be the mast
Of some great ammiral, were but a wand—
He walked with, to support uneasy steps
Over the burning marle, not like those steps
On heaven's azure; and the torrid clime
Smote on him sore besides, vaulted with fire.
Nathless he so endured, till on the beach
Of that inflamed sea he stood, and called
His legions, angel forms, who lay entranced
Thick as autumnal leaves that strow the brooks
In Vallombrosa, where the Etrurian shades,
High over-arched, embower; or scattered sedge
Afloat, when with fierce winds Orion armed
Hath vexed the Red-sea coast, whose waves o'erthrew
Busiris and his Memphian chivalry,
While with perfidious hatred they pursued
The sojourners of Goshen, who beheld
From the safe shore their floating carcases
And broken chariot-wheels. So thick bestrown,
Abject and lost, lay these, covering the flood,
Under amazement of their hideous change.
He called so loud, that all the hollow deep
Of hell resounded.

The rhetorical elements here are abundant and illustrative. The magnificent similes are so worked up with poetic circumstances and allusions as to have a value in themselves, apart from their bearing on the story. This, however, is a licence, and not a recommendation. In fact, however, neither the equipment of Satan, nor his action, can be steadily conceived, or made into a consistent picture. We have to be satisfied with a vague, incoherent grouping, and to derive our pleasure from the superb grandeur of the detached incidents and accompaniments,—the shield of Satan, his spear, his steps over the hot ground, which gave pain simply, but inflicted no corporeal injury, the angel-host lying in countless numbers on the burning lake, the shout of Satan to rally them. Every one of these gives occasion for a grand poetic embodiment, which stands as a beauty by itself, and not in virtue of being felicitously joined with the others.

The shield is depicted first by a series of adjectives, one—"ponderous," preceding; the rest following—"ethereal temper, massy, large, and round." Neither the order, nor the ready coherence of the whole is the best possible. The simile, however, is what makes up the picture. The broad circumference is likened to the moon, as magnified by the telescope of Galileo, whose place and occupation are set forth in detail. Such similes are so common with Milton as to be a part of his manner. Their sole justification is the pleasing aggregate of allusions, harmoniously worded. Their digressiveness and interruption to the story are treated as of no account; there being so little story to interrupt, and no cohering picture to disturb. It is scarcely possible to pourtray the personality of Satan so shielded: the moon could not be supposed to lie on the back of any conceivable figure. The elements employed are vast in their individuality: but we must not attempt to put them together.

The spear is also drawn by the help of a simile. Its character is peculiar. When we can get nothing great enough to come up to our subject, we employ the device of proportionality; the tallest pine *were but a wand.* This leaves the work half done; the reader must do the rest by the strain of his own imagination.

In Satan's march over the burning marle, his uneasy steps are contrasted with "those steps on heaven's azure"; but the occasion is not suited for the contrast: we need nothing to help us to appreciate the pain of the situation.

The next great picture is the angel-host as they lie spread out on the lake. The similes are intended to assist us in conceiving their numbers and density of packing. We might farther

have had a stroke or two to indicate the dimensions of the scene, so as to give something like angelic proportions to the individuals; these proportions being dwarfed and concealed by the two comparisons—the leaves of Vallombrosa, and the floating sedge.

After the long and digressive comparison, where he brings in the destruction of the Egyptians in the Red Sea, he very properly recalls the original situation—

> So thick bestrown,
> Abject and lost, lay these, covering the flood,
> Under amazement of their hideous change.'

The climax of this sentence is "abject and lost," for which the concluding line is the preparatory explanation. The sublime of this passage is the prostration of a mighty host, which pleases in two ways, the sense of pain, and the satisfaction at the sight of suffering, provided it be deserved.

The concluding phrase is grand and Miltonic:—

> He called so loud, that all the hollow deep
> Of hell resounded.

The defect, if any, here is the want of an epithet to give expansion to the scene, as in the line—

> To bellow through the vast and boundless deep.

The word "hell" does not so readily give us the sense of vast dimensions as of horror and suffering; and it was Milton's object to body it forth as a capacious locality, the scene, not simply of individual misery, but of collective and mighty prowess. The figure employed is surpassed in grandeur by the shout

> that tore hell's concave, and beyond
> Frighted the reign of Chaos and old Night.

(To be continued.)

—o—

Lessons in Latin.

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KEY TO EXERCISES.

EXERCISE 9.

A.

1. They are ploughing the fields. 2. He is teaching the sons of his master. 3. Were they not singing a song? 4. The farmers fear the bulls. 5. The shepherd will shear the sheep. 6. They will kill the cat and the dog of the shepherd. 7. They will seek peace. 8. The sailor leads the ship through the rocks. 9. Horace places a garrison near the wall. 10. Does not the son of the master, O boy, hurt (his) sister without the knowledge of (their) mother?

B.

1. Nonne oves tondent? 2. Mariti per portam juxta murum currebant. 3. Nonne feles lædent? 4. Mater clam maritum filium et filiam docebat. 5. Pastoris canes terrent. 6. Agricolæ hædos lædet, et oves non tondebit. 7. Rex et regina et filius et filia in hortum ambulant. 8. Præsidium juxta montem ponebant. 9. Felem in amnem jaciet. 10. Nonne literas discent?

EXERCISE 10.

A.

1. Mothers love their sons, but fathers love their daughters. 2. The schoolmasters teach their pupils that they may be wise. 3. Were not the shepherds shearing the sheep that they might sell the wool? 4. O boys, the masters are praising their slaves. 5. Do not cats eat mice? 6. The sun shines and warms the earth. 7. Let them keep their word that they may preserve (their) city. 8. The slaves earnestly entreat their masters that they may fight against the enemy. (Note there ought to be a preposition before hostes.) 9. The Romans conquer the Gauls, and drive (them) into the mountains. 10. The embassies come to Africa that they may (Eng., to) seek for peace.

B.

1. Hostes legationem mittent. 2. Legati milites conscribebant ut pugnarent. 3. Nonne milites ad Africam venient ut oppida incendent? 4. Sol terram tepidat ut messem ferat. 5. Pater, pueri fidem nonservant. 6. Romanus Galli filios occidebat. 7. Felis mures occidit, itaque frumentum non edet. 8. Nonne homines edent ut vitas conservent? 9. Horatius et Cæsar per urbem ambulabant. 10. Puellæ frumentum in aquam jaciebant.

EXERCISE 11.

A.

1. O son and daughter, you are breaking your word. 2. You were killing and eating the kids, that you might preserve your lives. 3. O mothers, you love your daughters. 4. The cat was killing the mice, and the dog was tearing to pieces the hare. 5. Horace is walking behind Cæsar. 6. Will you not run into the sea and collect shells? 7. The mother and father, O boys and girls, are calling (their) children. 8. He will write a letter that you may read it. 9. The master is binding the boy's head. 10. Will you not, O boys love your parents?

B.

1. Nonne, Romani, urbem incendebatis ut patriam conservaretis? 2. Gallinæ, ova non ponebatis. 3. Nonne, Romani, fidem servabitis? 4. In pratum per viam justa sylvam currebant. 5. Oves tondebitis. 6. Ad Africam venitis ut milites conscribatis. 7. Nonne, Galli, agricolæ hædos occiditis ut edatis? 8. Per urbem curremus. 9. In arvum præsidium mittit ut montem vigilet. 10. Horati et Cæsar, patriam proditis.

EXERCISE 12.

A.

1. You were plucking the wool for the girl. 2. Will you not, O son, run to the fountain for your mother? 3. He will kill the kids for (his) master and cook the food for (his) mistress. 4. They condemn Cæsar that they may preserve their country. 5. They were giving books to (their) father and mother. 6. Were not the

pupils learning their letters for their schoolmaster? 7. Are you not walking through the fields that you may pluck flowers for your sisters? 8. The girl was pouring out the milk for her cat, and the boy was bringing the flesh for his dog. 9. Will you not learn your lessons that you may be wise? 10. The slaves are ploughing the fields for their master.

B.

1. Libros filio et filiæ dabant ut legant. 2. Cæsarem capitis damnabitis ut patriam conservetis. 3. Nonne patri pomum dabis? 4. Nonne trans arvum currebas ut matri flores carperes? 5. Servus messem agricolæ metat ut granaria impleat (implēre is wrongly marked in Voc.). 6. Nonne pueri juxta amnem ludent? 7. Mariti mensas uxoribus parent sed uxores mensas maritis instruant. 8. Sol regi et servo fulget. 9. Mater filiæ laborat et filia fratri cantat. 10. Nonne, Romani, Gallos cis Alpes vincent ut urbem liberetis?

EXERCISE 13.

A.

1. Will not the boys give books to (their) master? 2. The boy's mother will provide work for her daughter. 3. The foxes seize the grapes. 4. Do not masters punish (their) pupils that they may learn (their) lessons? 5. The kids hear the lion and fear. 6. The oxen will plough the fields that they may produce a harvest. 7. Do not the sheep see the wolf and fly? 8. The dog and the cat are lying near the fire. 9. The boys fear their master because they do not know their lessons. 10. We understand the thing and approve it.

B.

1. Pueri ova rapiunt et gallinæ glociunt. 2. Nonne hædi timent quum leonis clamorem audiunt? 3. Pueri dictata discunt quum magistrum audiunt. 4. Nonne puellæ uvas matri carpunt ut viduæ det? 5. In flumen manus mergunt ut refrigerent. 6. Quum ad oppidum venis ut carmen discas? 7. Nonne leporem filii cani occides? 8. Puellæ dictata nesciunt, ergo non ludent. 9. Pueri libros sororibus monstrant. 10. Puellæ per pratum currunt ut equos et vaccas videant.

EXERCISE 14.

A.

1. The men of the husbandmen are ploughing the fields before they sow the seed. 2. He receives a multitude of neighbours into his state. 3. The cats were killing the puppies of the dogs. 4. The sons will read the books of their fathers and say them to their sisters. 5. The girls have the dresses of their mothers. 6. The hens lay eggs and cackle. 7. Romulus invites to a spectacle a number of his neighbours that the men may seize the virgins. 8. The puppies know the roar of their mothers and come. 9. The peacock will descend to the water and drink. 10. We see the colours of the feathers.

B.

1. Canum catuli trans pratum current. 2. Vaccæ aratoris et agricolæ liberos terrent. 3. Homo ovium lanam vendit et pecuniam patri dat. 4. Puerorum equi per flumen currunt. 5. Fluminum aquæ prata irrigant. 6. Arborum umbræ arva refrigerant. 7. Puellarum equos in aream pellit. 8. Pueri avium nidos rapiunt et sororibus dant. 9. Nonne, Horati, matri uvas dabis? 10. Venient ut urbem rapiant et domos incendant.

EXERCISE 15.

A.

1. I am plunging my hands into water. 2. I was singing a song that I might teach my son. 3. I will seize the body and throw it into the sea. 4. I was walking through the city that I might see the spectacle. 5. I will not neglect my work, that my master may praise (me). 6. I give milk to the boy that he may be strong. 7. I will bury the body of (my) son and throw flowers into his grave. 8. I am coming that I may (Eng., to) write a letter. 9. Are you not doing evil that good may come? 10. They call their mother that she may give them apples.

B.

1. Descendo ut panem matri feram. 2. Canem vocabam quiam felem vexabat. 3. Dictata discam ut ludam. 4. Cras prandium habebo si dictata recitem. 5. Dominus servum excitat ut oves tondeat. 6. Nonne librum matri dabo ut legat. 7. Sororem non lædam quia patri laborat. 8. Puer et puella trans viam currebant ut flores et uvas carpant. 9. Domino verum dicebat. 10. Nonne dictata discemus ut ludamus?

EXERCISE 16.

A.

1. The girl is worrying the dog with a whip. 2. In winter boys do not swim in the river. 3. Shall I not send a letter to my father that he may come here? 4. They were driving back the enemy with swords and darts, and were preserving the province by their valour. 5. He was cutting the harvest with a sickle, and carrying it to the barn (in) a waggon. 6. The orator was delighting the people with his voice, but not persuading them that they should (Eng., to) wage war. 7. O Horace, you will not dip your body into the water in winter. 8. In summer men lie in the meadow. 9. From fear of the enemy, they do not burn (Eng., light) the fires. 10. Hens lay (their) eggs in a nest that they may warm them with their feathers.

B.

1. Puer epistolam manu scribit. 2. Auctumno pueri in flumine natant. 3. Milites hostes gladiis telisque repellunt. 4. Mane Galli in colle apparent, sed Romani versus oppidum ambulabant. 5. Nemo filium clava lædit, sed Horatius servum flagro verberat. 6. Postea dux in Britannia regnat, et naves Galliam petunt. 7. Vere dux Africam militibus vincet et Carthaginem rapiet. 8. Leo ovem in prato dilaniabat. 9. Nonne auctumno semina spargit ut vere messem metat. 10. Matrem gladio occidit et sub arbore corpus sepelit.

EXAMINATION QUESTIONS. No. II.

The genitive singular is very similar in form to the nominative plural. The limiting genitive generally precedes the noun it limits. The dative singular in Latin, as in Greek, ends in 'i;' 'ai' becoming 'æ,' 'oi' and 'ii' simply 'o' and 'i.' The direct object is that on which the action of the verb takes place; the

indirect object is that to or for which the action of the verb takes place; *e.g.*, 'I give the boy a book.' The actual giving takes place on the book, and therefore 'book' is the direct object; but the act of giving is done for the boy, and therefore is the indirect object. 'Dative' is derived from 'dare,' 'to give,' and since to give is almost always followed by an indirect object, the case used for an indirect object was called the 'giving,' or 'dative' case. The crude form of a noun is found from its genitive plural by throwing away 'um' or 'ium,' as from 'agrorum,' 'canum,' 'montium,' we get as crude forms 'agro,' 'can,' 'monti.' A consonantal noun is a noun of the I declension whose crude form ends in a consonant. The genitive plural of the I declension has only one more syllable than the nom. sing.; if, therefore, the addition of 'ium' to the root would make the word of two more syllables, then the termination becomes 'um,' as 'lapis' (2 syl.), R. 'lapid,' gen. pl. (not 'lapidium' of 4 syl.) 'lapidum' (3 syl.). For exceptions see 101 and 102. The ablative is used to express time, rest, motion from, instrument, cause, manner, besides other things. The prep. 'in' is omitted before the name of a town or small island. 'In' when followed by abl. implies rest, but when followed by acc. it implies motion.

LESSON XVII.

PRONUNCIATION AND PERFECT ROOTS OF A, LONG E, AND I VERBS.

121. There are at present two modes of pronunciation of Latin to be met with in our schools. One of these has been in use from the time of Queen Elizabeth, and until within a few years was uniformly adopted by English-taught Latin scholars. The other was introduced a few years ago by some teachers and others who felt that the other method must be utterly unlike what was in use in the times of those whose writings we know best.

122. For the sake of reference we will call these two methods the old and the new.

123. In this lesson we shall only discuss the old.

124. In Latin every vowel is sounded, so that 'amare' becomes a-ma-ry, not a-mayor.

125. 'A' followed by a consonant is pronounced as the English 'a' in such words as 'an,' 'acute,' etc.; but long 'A' not so followed is pronounced as 'ay' in 'hay.' The diphthong 'Æ' is pronounced as it is in Cæsar.

126. 'C' is pronounced as 's' before 'e' and 'i,' but otherwise as 'k.'

127. Short 'E' not followed by a consonant is pronounced as 'y,' otherwise as 'e' in 'her.' But long 'E' is pronounced as 'ee' in 'veneer.'

128. 'G' before 'e' is pronounced as 'j' in 'jeer,' otherwise as 'g' in 'go.'

129. Long 'I' not followed by a consonant is pronounced as 'i' in 'high'; short I as 'i' in 'kick' when followed by a consonant, but like 'i' in 'animal' when not so followed.

130. Other letters are pronounced as they are in English.

131. Here are a couple of lines of Latin written phonetically:—

Bellum Faliscis intulērunt, quæ
Civitas Italiæ opulenta quondam fuit.

Read thus: Bell-um Fa-lis-sis in-tu-lee-runt, quee si-vi-tas It-a-ly-ee ŏp-u-lent-y-a quon-dam few-it.

132. With regard to the length of vowels there are three general rules. (1) A vowel before two consonants or a double consonant (j, x, z) is long. (2) All diphthongs are long. (3) A vowel before another vowel in the same word is short, as

Cæsar fīlium Indūlget.

133. The length of the first 'i' in filium is an accident of the word, and will be always printed in the vocabularies.

134. The lengths of vowels in final syllables will be discussed in a future lesson.

135. Hitherto we have always used the same roots for the five different tenses we have learnt.

136. The other five tenses in the indicative and subjunctive mood of the active voice are formed from another root, called the perfect, or second.

137. The perfect roots of A, long E, and I verbs are formed from the first, or present roots thus; taking 'arare,' 'to plough;' 'habere,' 'to have;' 'scire,' 'to know':—

Inf. Mood.	*Pres. Root.*	*Perf. Root.*
Ar-are	Ar	Ar-av
Hab-ere	Hab	Hab-u
Sc-ire	Sc	Sc-iv

The terminations of these five tenses are the same for verbs of all conjugations.

138. Here is a scheme of the 3rd persons singular of active voice as far as indicative and subjunctive moods are concerned:—

139. INDICATIVE MOOD.

Tense.	*Root.*	*A.*	*Long E.*	*Short E.*	*I.*	*English.*
Present	Pres.	at	et	it	it	he is —ing or does — or —s
Imperf.		abat	ebat	ebat	iebat	he was —ing
Future		abit	ebit	et	iet	he will —
Perfect	Perf.		it, pl. erunt			he has —d or —d
Pluperf.			erat, pl. erant			he had —d
Fut. Perf.			erit, pl. erint			he will have —d

SUBJUNCTIVE.

Present	Pres.	et	eat	at	iat	he may — or let him —
Imperf.		aret	eret	eret	iret	he might —
Perfect	Perf.		erit			he may have —d
Pluperf.			isset			he might have —d

140. The perfect indicative is sometimes translated by '—d,' as 'he ploughed,' or by 'he has —d,' as 'he has ploughed.' The context alone can decide which is to be used.

141. The third person plural (they) of the perfect tense ends in 'ērunt' (not 'int'), but if examined in connection with the third persons plural of plup. and fut. perf., which are formed regularly, it will be easily remembered.

erunt	they have
erant	they had
erint	they will have

142. The 1st persons singular and plural of the perfect tense will be given later on. Of the rest, the 1st pers. sing. of the fut. perf. ends in 'o,' the others in 'm,' and the other persons are perfectly regular.

143. This scheme of third persons singular ought to be written out every day before you begin your exercise.

144. VOCABULARY 17.

Note in future the numbers to 'not' or 'non' (3), 'not?' or 'nonne' (4), 'that' or 'ut' (6), 'in' or 'in' (16), 'in' or 'into' (4), 'but' or 'sed' (6), 'because' or 'quia' (7), 'therefore' or 'ergo' (13) or 'itaque' (16) will be omitted in the exercise. A list had therefore better be made of these conjunctions and prepositions, of constant use, as they are introduced.

English.	*Latin.*		*Derivative.*
Brutus	Brutus	G. Bruti	
To build	Ædĭfĭcāre	R. Ædific	Edifice
Tarquin	Tarquĭnius	G. Tarquinii	
Temple	Templum	G. Templi, n. g.	Knight Templar
Capitol	Căpĭtōlium	G. Capitolii, n. g.	
So	Ita, a conj.		
To break	Vĭōlare	R. Viol	Inviolable
Year	Annus	G. Anni	Annual
Athens	Athēnæ (no sing., A decl.)		
Five	Quinque (not declined)		Quintessence
Consul	Consul	G. Consŭlis	Consular
Cave	Antrum	G. Antri, n. g.	
After	Post, prep. gov. acc. case		Postscript
Twenty	Vīginti (not declined)		
To rebel	Rēbellare	R. Rebell	Rebellion
To swear	Jūrare	R. Jur	Jury
To sleep	Dormire	R. Dorm	Dormitory
Tuscan	Tuscus	G. Tusci	
To overcome	Sŭpĕrare	R. Super	Insuperable
Porsena	Porsēna	G. Porsenæ	
Time	Tempus	G. Tempŏris, n. g.	Temporal
Dignity / Power	Dignĭtas	G. Dignitātis	
Tribune	Trĭbūnus	G. Tribuni	Tribunal
Bear	Ursus	G. Ursi	
For a long time	Diu, adv.		
To last	Persĕvērare	R. Persever	Persevere
To open	Apĕrire	R. Aper	Aperture
To wound	Vulnĕrare	R. Vulner	Vulnerable
To storm	Oppugnare	R. Oppugn	
Against	Contra, prep. gov. acc. case		
No-one	Nēmo	G. Nemĭnis	
Except	Præter, prep. gov. acc. case		
Nightingale	Luscĭnia	G. Luscinĭæ	
But	Vērum, conjunction		
Or	Aut, conj.		

145. EXERCISE 17.

A.

1. Tarquinius templum in Capitolio ædificavit. 2. Ita annus quinque consules habuit (7). 3. Post viginti annos Galli (10) contra Romanos (10) rebellaverunt. 4. Brutus juraverat. 5. Cæsar (10) vitam (11) conservavit (10) ut hostes (10) vinceret (10). 6. Nonne Romani (10) Tuscos bello (16) superaverunt Porsenæ tempore? 7. Verùm dignitas tribunorum non diù perseveravit. 8. Avis (14) in arbore (1) nidum (14) habuit (7). 9. Puella (8) manu (8) caput (9) vinciebat (4). 10. Patres (14) filiorum (7) epistolas (7) aperiunt.

B.

1. They had wounded the lion (13) with a sword (16). 2. In the winter (16) bears sleep in a cave or in a tree (1). 3. They have broken their word (faith) (10) at Athens. 4. In the time of Milo (5) enemies (10) stormed the city (7). 5. The boy (7) and the girl (8) had rebelled against their parents (11). 6. No one had (7) a horse (13) except Cæsar (10), but he had five horses. 7. I had ploughed (2) a field (5) with (my own) hand (8) that the ploughman (14) might see (3). 8. Money (5) delighted (7) the hearts (5) of the boys. 9. They have heard (4) the song (9) of the nightingale in the wood (11). 10. The nightingales sang (2) and the hares leapt (danced) (2).

LESSON XVIII.

DATIVE AND ABLATIVE PLURAL.

146. The dative and ablative plural of all nouns are alike. They generally end in 'bus,' preceded by the characteristic; but 'abus' and 'obus' are almost always written 'is,' and 'ubus' generally 'ibus,' so the terminations become—

	1	2	3	4	5
Characteristic	a	o	i	u	e
Dat. and Abl.	abus (is)	obus (is)	ibus	ubus (ibus)	ebus

147. Here is a complete scheme of nouns, in which the forms generally found are alone inserted:—

	1	2	3	4	5	
Characteristic	a	o	i	u	e	Force.
			Singular.			
Nom.	Word found in the Vocabulary.					Subject.
Voc.	Like nom., except O nouns in 'us,' whose voc. end in 'e'					Person addressed
Acc. in 'm'	am	um	em	um	em	Obj. of act. verb
Gen. in 'ius'	æ	i	is	us	ei	Limiting
Dat. in 'i'	æ	o	i	ui	ei	Indirect obj.
Abl. (like char.)	a	o	e	u	e	Time, means, etc.
			Plural.			
Nom. and Voc. (Gen. sing.)	æ	.i	es	us	es	
Acc. in 's'	as	os	es	us	es	
Gen. in 'rum'	arum	orum	ium	uum	erum	
Dat. and Ab. in 'bus'	is	is	ibus	ibus	ebus	

148. VOCABULARY 18.

English.	*Latin.*		*Derivative.*
River	Amnis	G. Amnis, m. g.	
Rein	Frēnum	G. Freni, n. g.	
To hold	Tĕnēre	R. Ten	Tenement
Snow	Nix	G. Nivis	
Crow (A)	Corvus	G. Corvi	Corvine
Nail / Talon	Unguis	G. Unguis, m. g.	
Eye	Ocŭlus	G. Oculi	Ocular
That-not	Ne, conj. used for 'ut non' in a purpose clause		
Rightly	Rectùm, adverb		Rectitude
To see	Adspĭcĕre	R. Adspici	Aspect
Needle	Acus	G. Acūs (D. and Ab. pl. acubus)	
Finger	Dĭgĭtus	G. Digiti	Digit
Man	Vir	G. Viri	Virile
To hold back	Rĕtĭnēre	R. Retin	Retentive
Inhabitant	Incŏla	G. Incolæ	
To inhabit	Hăbĭtare	R. Habit	Habitation
Until	Dōnec, conj.		
To lay waste	Vastare	R. Vast	Devastation
To burn	Urĕre	R. Ur	Combustible
Grass	Grāmen	G. Gramĭnis, n. g.	
Heat	Călor	G. Calōris	Caloric
Asia	Asia	G. Asiæ (length of 1st A doubtful)	
Ditch	Fossa	G. Fossæ	Fosse
Priest	Săcerdos	G. Sacerdotis	Sacerdotal
Altar	Ara	G. Aræ	
Immediately	Stătim, adverb		
To answer	Respondĕre	R. Respond	Response

EXERCISE 18.

A.

149. 1. Canem (14) in amnem manibus (8) mergebant (8). 2. Equos (13) frenis tenuerunt. 3. Hieme (16) pueri (7) in nive ludunt (12). 4. Agricolæ (7) agros (5) manibus non araverunt (2) sed servi (7) araverunt. 5. Corvus alis (14) et unguibus Galli (10) oculos vulneravit (17) ne rectùm adspiceret.

6. Puellæ (8) acubus digitos vulneraverunt (17). 7. Hieme (16) pueri (7) in amnibus non natant (16). 8. Ciceronis (1) diebus (8) viri regis (8) vocem (7) non audiverunt (4). 9. Horati (6), nonne manibus equum (13) retinebis? 10. Magister (13), nonne flagris (16) discipulos (7) verberas.

B.

They have stormed (17) the city (7) and whipped (16) (Eng., beaten) the inhabitants with whips (16). 2. The citizens (8) inhabited the city (7) until the enemy (pl.) (10) laid (it) waste with fire (13). 3. Let the boys (7) play (12) with their whips (16) in the meadow (11). 4. In Africa (10) the sun (10) burns the grass with (its) heat. 5. In Asia bears (17) and (in Eng. this 'and' would be omitted, but not so in Latin) wolves (8) and lions (13) live (6). 6. The girls (8) wounded (17) (their) hands (8) with (their) needles. 7. O fathers (14), you will not whip (16) (your) daughters (7) with whips (16). 8. They were driving (10) the soldiers (6) into the ditch with their swords (16) and (use 'que') darts (16). 9. The priests were plucking (4) (Eng., gathering) flowers (6) for the altar. 10. The girls (8) heard (4) the voices (7) of their mothers (14), but did not immediately answer ('did' is a sign of the perfect tense when it refers to a single action).

(To be continued).

ANSWERS TO ALGEBRA QUESTIONS IN 'THE SCHOLAR,' FOR MAY, 1883.

EXERCISE XIX.

(1) $a+2$. (2) $x-3$. (3) $2a+3$. (4) x^2-x+1. (5) $-x+5$, or $x-5$. (6) $-a-2$, or $a+2$. (7) $x-5$. (8) $3a-2$. (9) $x+2$. (10) $a-11$.

EXERCISE XX.

(1) $x+3$. (2) $a-3x$. (3) $x-1$. (4) $2x+5$. (5) $2x+7$. (Divide the first remainder by -33.) (6) $x+3$. (7) $-x+5$, or $x-5$. (8) $2(2x+9)$. (9) $3(a+2b)$. (10) a^2-2a+1. (11) $3(3x-2)$. (12) $2a+3b$. (13) x^2+4x+4. (14) $x-1$. (15) $a+b$. (16) $x+2y$.

ANSWERS TO ARITHMETICAL QUESTIONS IN THE 'SCHOLAR,' FOR MAY, 1883.

STANDARD V.

A. 1. £26 9s. 6½d.
2. £264 0s. 8½d.
3. £5452 8s. 1½d.

B. 1. £65,306 16s. 6½d.
2. £17 5s.
3. £8 2s. 4½d.

C. 1. 2¾.
2. £313 15s. 6d.
3. 70¼ lbs.

D. 1. ⅞.
2. £409 11s. 2¾d.
3. £4 11s. 11¾d.

E. 1. £118 15s.
2. ¼.
3. £184,128 2s. 8½d.

F. 1. £191 13s. 10d.
2. £3 13s. 0½d.
3. 400 yards.

Advanced Examination.

1. £13 2s. 5½d.
2. 4¾.
3. £1073 8s. 9d

STANDARD IV.

A. 1. £2,246,298 19s. 3½d.
2. £90,475 19s. 9d.
3. £612 5s. 0¾d.—12.

B. 1. 9,408,960 sq. in.
2. 974 dys. 6 h. 14 m. 43 sec.
3. £96 3s. 11¾d.—62.

C. 1. £106 3s. 4d.
2. 559,872 c. in.
3. 16,170 cr.

D. 1. £26 16s. 3d.
2. £4 17s. 6d.
3. 5896 sq. yd. 4 ft. 31 in.

E. 1. 575,580 sec.
2. £12,629 11s. 11½d.
3. £726 6s. 6d.

F. 1. 1s. 8¼d.—3271.
2. £31,772 14s. 5½d.
3. 12 ton 2 cwt. 1 qr. 8 lb. 10 oz. 12 dr.

Advanced Examination.

1. M. 8s., w. 7s., b. 5s. 6d.
2. 233 ton 12 cwt. 1 qr. 12 lb.
3. 322,854 min.

STANDARD VI.

A. 1. 7¾.
2. 114·5135.
3. £15 15s. 2¾d.

B. 1. 1⅛.
2. ·004.
3. £39 8s. 0¾d.

C. 1. $\frac{11}{15}$ cwt.
2. £778 6s. 7½d.
3. 54 days.

D. 1. £71 19s. 6¾d.
2. $\frac{15\frac{1}{2}}{37\frac{1}{2}}$ guinea.
3. £211 4s.

E. 1. 4⅜ per cent.
2. 5$\frac{11}{12}$ days.
3. $\frac{31}{1111}$.

F. 1. ⅛.
2. 25 to 12.
3. £5 1s. 8$\frac{1}{16}$d.

Advanced Examination.

1. 5$\frac{1}{16}$ hours.
2. £450.
3. £4 16s. 9$\frac{1}{15}$$\frac{1}{15}$$\frac{1}{15}$d.

STANDARD VII.

A. 1. £3 1s. 8¾d.
2. 19s. 0¾d.
3. £16 9s. 4$\frac{11}{12}$d.

B. 1. 62$\frac{1}{16}$ lb.
2. £478 5s.
3. 44 per cent.

C. 1. £2383 2s. 6d.
2. 3$\frac{3}{16}$ per cent.
3. £8006 4s.

D. 1. £78 5s. 8$\frac{7}{8}$$\frac{7}{8}$d.
2. £1 4s. 4$\frac{4}{15}$d.
3. 5$\frac{5}{16}$ per cent.

E. 1. £4862 0s. 6d.
2. 12 per cent. gain.
3. £6 13s. 4d. gain.

F. 1. 5$\frac{11}{17}$ per cent.
2. £800.
3. 17$\frac{1}{2}$ inches.

Advanced Examination.

1. 39·42583 inches.
2. £225 gain.
3. 4½ per cents. is the best.

SOLUTIONS OF THE ADVANCED EXAMINATION QUESTIONS IN 'THE SCHOLAR' FOR MAY, 1883.

STANDARD IV.

1. A man gets 1s. more than a woman, and (1s. × 1s. 6d. =) 2s. 6d. more than a boy; hence 2s. 6d. × 40 = £5, excess that the 40 men get beyond each receiving a boy's share; 1s. 6d. × 60 = £4 10s., excess received by the women; total £9 10s. excess. Then £59 − £9 10s. = £49 10s., which ÷ 180 (the number of recipients) = 5s. 6d., a boy's share. Then a woman gets 7s., and a man 8s. Ans.

2. £8176 12s. 6d. = 2,616,520 three-farthings, and 3¾d. = 5, then 2,616,520 ÷ 5 = 523,304 lb. = 233ton 12cwt. 1qr. 12lbs. Ans.

3.

		d.	h.	m.
The remainder of March	=	14	17	25
The 6 intervening months	=	183	0	0
The extent into October	=	26	11	29
Ans. 322,854 min.	=	224	4	54

STANDARD V.

1.

			£	s.	d.
28	lb. of tea at 1½d. an oz.	=	3	5	4
42	lb. of soap at 2s. 4d. a cwt.	=	0	10	3
3	cwt. of bacon at 6¾d. a lb.	=	9	2	0
7	oz. of cloves at 6s. a lb.	=	0	2	7½
4¼	cwt. of rice at £15 15s. a ton	=	3	10	10½
8	lemons at 7½d. a doz.	=	0	0	5
	Total	=	£16	11	6
	Less 2½d. in the 1s. (331½s.)	=	3	9	0¾
	Ans.		£13	2	5¼

2. $\frac{3}{4}+\frac{5}{8}+\frac{7}{8}+\frac{3}{4}+\frac{9}{10}+\frac{3}{8}=$

$\frac{72+100+105+90+108+80}{120}=\frac{555}{120}=4\frac{75}{120}=4\frac{5}{8}$. Ans.

3. Bringing both the areas to quarter-roods we have 53 and 687 respectively. Then £82 16s. 3d. ÷ 53 = £1 11s. 3d. price of one quarter-rood, which × 687 = £1073 8s. 9d. Ans.

STANDARD VI.

1. $(10 \div 1\frac{1}{4}) = (\frac{10}{1} \times \frac{4}{5}) = \frac{40}{5}$ hours in which A does 1 acre
$(9 \div 1\frac{1}{2}) = (\frac{9}{1} \times \frac{2}{3}) = \frac{18}{3}$,, ,, B ,, ,,
$(5 \div \frac{5}{8}) = (\frac{5}{1} \times \frac{8}{5}) = \frac{40}{5}$,, ,, C ,, ,,
Then $\frac{5}{40} + \frac{3}{18} + \frac{5}{40} = \frac{13}{120}$ frac. of an acre done in 1 hour;
And $(2\frac{1}{2} \div \frac{13}{120}) = \frac{5}{2} \times \frac{120}{13} = \frac{600}{26} = 23\frac{2}{13}$ hours. Ans.

2. As £100 makes £3 interest in a year it would make £7 10s. in $2\frac{1}{2}$ years; hence £33 15s. ÷ £7 10s. = $4\frac{1}{2}$ *hundred* £ = £450. Ans.

3. Multiplying the two weights by 100 and the last two numbers by 10 to clear them of decimals, then working by proportion we have—

$$\frac{3\cdot65 \times 14835 \times 81}{515 \times 88} = £4\ 16s.\ 9\tfrac{1}{2}\tfrac{1}{2}\tfrac{1}{2}\tfrac{1}{2}d.$$ Ans.

STANDARD VII.

1. ·85 of 1·15 inches = ·9775 inches deep collected.
4840 × 500 = 2,420,000 square yards in collecting area.
300 × 200 = 60,000 section of the reservoir.
2,420,000 ÷ 60,000 = $40\frac{1}{4}$ multiple the area is of the reservoir. Hence the water will be $40\frac{1}{4}$ times as deep in the latter as on the former; and ·9775 in. × $40\frac{1}{4}$ = 39·42583 in. Ans.

2. £5000 + 10 per cent. = £5500, the 1st result.
£5500 − 20 ,, ,, = £4400, 2nd ,,
£4400 + 25 ,, ,, = £5500, 3rd ,,
£5500 − 5 ,, ,, = £5225, 4th ,,
Hence £5225 − £5000 = £225 final gain. Ans.

3. £ 82 10s. ÷ 3 = £27 10s., principal making £1 int. in 3p.cts.
£ 97 10s. ÷ 4 = £24 7s. 6d. ,, ,, ,, ,, 4 ,,
£104 10s. ÷ $4\frac{1}{2}$ = £23 4s. $5\frac{1}{2}$d. ,, ,, ,, ,, $4\frac{1}{2}$,,
£121 10s. ÷ 5 = £24 6s. ,, ,, ,, ,, 5 ,,
As the $4\frac{1}{2}$ per cents. makes £1 interest with the *least* principal, it is the best investment. Ans. $4\frac{1}{2}$ per cents.

ANSWERS TO ARITHMETICAL QUESTIONS IN 'THE LITTLE LEARNER,' FOR MAY, 1883.

STANDARD I.

A. (1) 297
(2) 108
(3) 119
B. (1) 2,355
(2) 733
(3) 1,745
C. (1) 1,416
(2) 700
(3) 2,622
D. (1) 352
(2) 31
(3) 246
E. (1) 145
(2) 617
(3) 91
F. (1) 658
(2) 361
(3) 6
G. (1) 28,919
(2) 9,741
(3) 14,731
H. (1) 2,564
(2) 456
(3) 5,687
I. (1) 704 oranges
(2) 16,141,810
(3) 32 years
J. (1) 2,436,185,442
(2) 6,445
(3) 99 pence

STANDARD II.

A. (1) 380,538
(2) 87,145
(3) 82,187
B. (1) 15,055
(2) 5,746
(3) 916
C. (1) 335,734
(2) 574,056
(3) 5,702,760
D. (1) 8,456,481
(2) 7,992,081
(3) 29,301,448
E. (1) 634,780,120
(2) 2,858,703,781
(3) 1,081,462,200
F. (1) 21,905
(2) 13,877
(3) 8,869 + 5
G. (1) 7,964 + 4
(2) 1,887
(3) 8,084 + 7
H. (1) 3,853 + 30
(2) 122 + 5,314
(3) 8,556 + 19
I. (1) 73,695
(2) 1,134 hours
(3) 292 oranges
J. (1) 4,760 steps
(2) 495 yards
(3) 3s. 9d; 7s. 8d; 10s. 10d.

STANDARD III.

A. (1) 988
(2) 1,111 + 31
(3) 989 + 40
B. (1) 11,066 + 10
(2) 10,927 + 43
(3) 1,637 + 77
C. (1) 17,218 + 185
(2) 6,209
(3) 5,670
D. (1) 9,988 + 154
(2) 6,708
(3) 2,501 + 4,509
E. (1) £34 4s. 6d.
(2) £228 1s. 4d.
(3) £1,334 12s. $1\frac{1}{2}$d.
F. (1) £11,513 4s. $3\frac{1}{2}$d.
(2) £10,666 17s. $10\frac{1}{2}$d.
(3) £43,488 5s. $7\frac{1}{2}$d.
G. (1) £108 13s. 7d.
(2) £9 18s. $8\frac{1}{2}$d.
(3) £435 10s. $9\frac{1}{2}$d.
H. (1) £3,627 5s. $5\frac{1}{2}$d.
(2) £1,995 18s. $5\frac{1}{2}$d.
(3) £99,811 16s. $7\frac{1}{2}$d.
I. (1) 28 oranges
(2) 16s. 4d.
(3) Half-sovereign and half-crown
J. (1) 716
(2) £15 14s. 9d.
(3) 5s. 8d.

Physiology.

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Gold Medallist and University Scholar, Physician to the City Dispensary.

CHAPTER II.—(*continued*).

We have now taken a general view of the various parts of which the wonderful mechanism of the human body consists. Let us next glance at the working of this mechanism, and endeavour to grasp the fact that all the various functions of the body are closely correlated and interdependent.

The functions of the human body cannot be maintained beyond a very limited period without the supply of food, any more than the steam-engine can work without an abundant supply of fuel. This food is prepared for its ultimate destination in the body by the chemical action of secretions poured out by the digestive organs. Thus prepared and rendered assimilable, it passes directly or indirectly into the blood. The blood is made by the food, and cannot be maintained of a proper quality without the frequent addition of nutriment. On the other hand, the blood is being constantly drained by all the different organs and tissues of the body, as it supplies them with the nutriment they require for building up and maintaining their composition.

The elaborated food is not the only acquisition of the blood. It also receives oxygen from the lungs; and this supplies the material by which the food, and to a certain extent, the tissues of the body are burnt or oxidised. By means of this oxidation the body-heat is maintained.

Oxidation is a necessity of existence, but the products of oxidation are so many impurities in the blood, which, unless removed, will as surely poison a man as a dose of prussic acid. To get rid of these impurities, certain excretory organs are supplied, which eliminate all the oxidised and waste material from the body. The main excretory organs are the lungs, the kidneys, and the skin. The main excretions are water, carbonic acid, and urea, which represent the ultimate result of the oxidation of the tissues and the food.

We may compare the blood to a wandering tradesman selling multiple wares. He receives his goods from the alimentary canal and the lungs, and forthwith carries them to every part of the body. One minute in the brain, the next he is at the end of the little finger; now enabling us to think, and anon to run. And just as all the customers of the tradesman

do not require the same goods, so each organ of the body selects those materials from the blood which are required for the maintenance of its integrity. This is known as the 'selective power' of the organs. Much business is done in the main thoroughfares of the system (the large arteries and veins), but most in the bye-ways and alleys, the minute capillary blood-vessels, which are in intimate contact with the textures of the body.

Another interesting point you will note, is that the food can only undergo the changes which result in the formation of blood when it is acted on by certain secretions, which themselves are derived from the blood. So that while it is true that the food makes the blood, it is none the less true that the blood makes its own blood.

Not only is the blood a wandering tradesman, but at the same time acts as a street scavenger; and the combination of these two tasks does not interfere with the efficiency or cleanliness of either. When the blood has carried to the various parts of the body the nutriment they require, it brings away the oxidised products of their action which would otherwise poison the organs, and prevent them carrying on their functions. These impurities are in an incredibly short time carried to the lungs, the kidneys, or the skin, and thence eliminated. The blood is thus constantly scouring every part of the body, washing away its impurities, and carrying them to the proper outlets.

Besides the parts of the body already considered, there are the senses which put us in relation with the outside world; and the brain which interprets the stimuli brought to it by the senses, besides exerting a general oversight and control over the various functions of the body. The muscular system renders motion and locomotion possible, and is of immense importance. It is in close relation with the nervous system. Brain and muscle are closely co-ordinated. The first manifestation of mind is in motion; the execution of any wish in a child involves muscular effort. Muscle, then, is the primary channel along which the impulses of mind are projected, though doubtless other channels are formed at a later period.

It is plain from the *resumé* of the functions of the human body which we have given, that Physiology naturally divides itself into the study of the *Organs for preparing the blood; the Blood; Organs for purifying the blood;* and *Organs for co-ordinating the other organs, and putting us in relation with the outside world.*

It will be convenient to consider in the first place the histology, *i.e.*, the microscopic structure of the various elementary tissues of the body, in order to avoid repetition further on. Also, we may add a section on the organs which modify the blood; and although the muscular and skeletal structures are logically closely connected with the nervous system, it will be convenient to consider them at an early period, as the technical names involved will be repeatedly required.

We shall study the various parts of our subject in the following order :—

1. Histology of Elementary Tissues.
2. Motor and Locomotor Organs { bones. joints. muscles.
3. Organs for preparing the Blood { stomach and intestines, liver and pancreas, lymphatic and lacteal vessels, and glands.
4. The Blood and Circulatory Organs.
5. Organs for Modifying the Blood { spleen, liver, ductless glands, suprarenal bodies.
6. Organs for Purifying the Blood { lungs, skin, kidneys.
7. The Nervous System ... ... { brain, spinal cord, sympathetic system, nerves, sense organs.

CHAPTER III.

HISTOLOGY OF THE TISSUES.

IT was formerly thought that every part of the body was derived from cells. This widely accepted theory is now shown to be partially untrue. There are some parts of the body that have never been cells. Besides this there is great difficulty in defining what constitutes a cell. In the vegetable world, it consists of a cell-wall, forming a sac, which encloses protoplasmic cell-contents, and specially modified parts called a nucleus and nucleolus. But in the animal world the cell-wall is absent or very indistinct. And some animal cells contain no nuclei. We must, therefore, exclude cell-wall and nucleus from our definition of an animal cell.

It is found that there are in various parts (and especially in the blood) tiny molecules much smaller than blood corpuscles, which are probably the primary elements out of which the tissues of the body are formed. These molecules are similar to those found in milk. They may be artificially imitated by taking the glairy white of an uncooked egg and beating this up in a basin with a little olive oil. After a time, a milky-looking liquid is formed, and if water is added to it a very good imitation of natural milk is produced. The thorough mechanical admixture causes each little globule of oil to become coated over with a little of the liquid albumen (of which white of egg is composed). If you examine some of these globules under the microscope you will find they are extremely minute, and on comparing them with the globules found in a drop of milk you will see that they are practically identical. In each case they are albumen-coated oil globules. Such globules or molecules are absorbed from the alimentary canal, as the result of the digestion of fats, and it is probable that these on getting into the blood, are partially the source of its white corpuscles.

Cells are found in every part of the body. They cover every surface and line every cavity. All the internal and external surfaces of the body are lined by cells. Where cells form a covering which is open to the external surface of the body it is called *epithelium*, as in the case of the cells covering the skin, the alimentary canal, the bladder, etc. The cells covering the skin have a special name given to them, namely, that of *epidermis* (*epi*, upon; *dermis*, skin). Where cells line a closed cavity, as the interior of blood and lymphatic vessels, the heart, and serous cavities, they constitute an *endothelium*. It is very common to use the term epithelium to include all the varieties of cells named, but the terms epidermis and endothelium are always restricted, as stated above.

The main varieties of epithelium are :—

1. *Tesselated* or *pavement* epithelium (endothelium),

which lines all closed cavities and is characteristic of them. It consists of a single layer of flat nucleated cells arranged ends to ends and not overlapping at all. The average size of the cells composing it is $\frac{1}{2000}$" diam. (Fig. 6, *a*.)

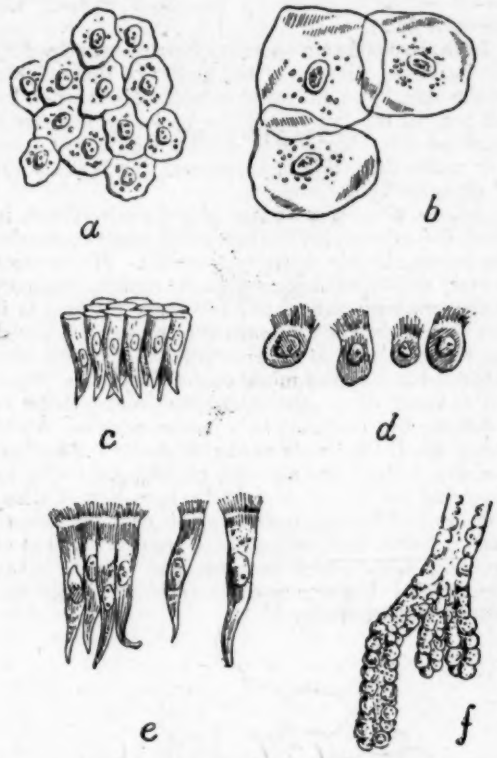


Fig. 6.—Varieties of Epithelium, much magnified.

(*a*) Tesselated epithelium from a serous membrane.
(*b*) Squamous epithelium, from inside of mouth.
(*c*) Cylindrical epithelium of intestines.
(*d*) Spherical ciliated epithelium.
(*e*) Cylindrical ciliated epithelium.
(*f*) One of gastric tubules, showing cylindrical epithelium towards the surface, and spheroidal epithelium lower down.

2. *Squamous epithelium*, so called because the cells composing it overlap, like the scales on a fish's back, or like the tiles on a roof. It consists of large (about $\frac{1}{300}$" diam.) flattened cells, containing an indistinct nucleus and granules. (Fig. 6, *b*.) This kind of epithelium covers the whole of the skin, and extends from the mouth downwards to the commencement of the stomach. It is also found on the mucous membrane of the eye, the bladder, etc.

3. *Cylindrical epithelium* (or columnar) is composed of cells which average $\frac{1}{1000}$" long and $\frac{1}{2000}$" broad. They are not flattened like the two last varieties, but stand upright on mucous surface, and contain nuclei and fluid contents. They are found lining the whole of the respiratory tract from the vocal cords down to the smallest branches of the bronchial tubes, also lining the whole of the alimentary canal from the end of the gullet downwards, and on some other mucous surfaces. (Fig. 6, *c*.)

4. *Spheroidal epithelium* is so called from the more or less rounded outline of the cells composing it, though commonly they are rather polygonal from mutual pressure. It occupies the true secreting parts of all glands, and hence is also called *glandular* epithelium. It occurs in parts of the kidney, lining the deep parts of the gastric tubules, in the salivary glands, etc. (Fig. 6, *f*.)

5. *Ciliated epithelium* is usually cylindrical in shape, but occasionally of some other shape. In ciliated cells the upper margin is prolonged in the form of minute thread-like processes called cilia, about $\frac{1}{5000}$ of an inch long. (Fig. 6, *d* and *e*.) These cilia in the living condition are probably constantly waving backwards and forwards, and so producing a current which is always towards the orifice of the canal in which they are contained. The columnar epithelium lining the respiratory tract is of this ciliated kind, and it is probable that the action of the cilia aids the escape of mucus and particles of foreign matter. The same kind of epithelium is found lining the central canal of the spinal cord, and in the young it lines the ventricles of the brain; it also covers the mucous membrane of part of the uterus, the Fallopian tubes, and the efferent ducts of the testis.

The various kinds of epithelium serve to protect, and at the same time to render smooth, the surfaces on which they are placed.

Tesselated and columnar epithelium secrete small quantities of serous and mucous liquids, while spheroidal epithelium secretes various ferments which act chemically on food.

Ciliated epithelium is of much greater importance in some lower animals than in man. The ciliary movement is not in any way under the control of the will or the nervous system; it continues for several hours after death on the removal of the epithelium from the body, if it is kept moist. The vapour of chloroform stops the movement during the time it is present; carbonic acid also stops the movement. There is every reason for regarding ciliary motion as comparable to muscular contraction, although the structure of muscle and ciliary epithelium is very different, and the former is controlled by nervous influence while the latter is not. Both are exhibitions of vital contractility and result in the production of force.

Epithelium is nowhere supplied directly with blood-vessels, but derives its nourishment by imbibition from the subjacent tissues.

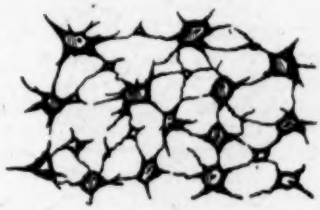


Fig. 7.—Connective-tissue Corpuscles of Cornea.

Connective tissue, also called *areolar* tissue, is met with in some form or other all over the body; and the connective tissue in one part is continuous, directly or indirectly, with that in all other parts of the body. It connects the skin with the deeper parts, while at the same time it both joins these with and separates them from each other. If you dissect the leg, say of a rabbit, separating the individual muscles, nerves,

arteries, etc., you will find that this delicate film-like connective-tissue has to be torn or cut, and that on trying to put the parts back in their former places, everything appears 'messy'; the delicate connecting material has been destroyed.

If you place a little connective tissue under the microscope, having first carefully, by means of two needles laid it out flat, it will be seen to consist of two parts—delicate band-like fibres intersecting in various directions, and, scattered among these, cells of varying shape, known as *connective-tissue corpuscles.*

Some of these cells are unbranched, others present a main body and several branches running out from this, the branches uniting with corresponding branches from other cells, so as to form a network.

If a piece of connective-tissue is treated with acetic acid, the greater part of it swells up and disappears, and only certain curled-up fibres remain, of a yellow colour, branching and joining with one another.

The fibres unacted on by acetic acid are called *Yellow fibrous* or *Elastic tissue;* those dissolved by acetic acid are called *White fibrous tissue;* and these each exist alone in certain situations.

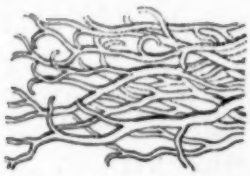


Fig. 8.—Fibres of Elastic Tissue.

White fibrous tissue is found alone in tendons (or 'leaders,' as they are commonly called), and in certain membranes covering muscles. Many muscles end in tendons, and the tendons are attached to bones. Round about the wrist a number of these tendons can easily be felt. Each consists of delicate white fibres running parallel with one other; by acetic acid they are dissolved. (Fig. 9.) White fibrous tissue is very strong, and quite inelastic. It is found where these properties are desirable, as in ligaments and tendons.

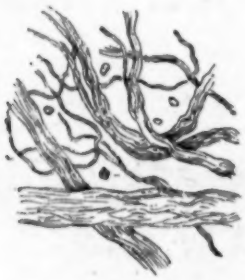


Fig. 9.—White Fibrous Tissue.

Yellow fibrous or *elastic tissue* as a rule occurs mixed with the white variety. In a few positions it exists alone. Thus the vocal cords are formed by it, and the ligaments uniting the arches of the vertebræ together (ligamenta subflava). It forms a large part of arteries and veins, the trachea, lungs, and other parts of the body, and confers on these parts a combination of elasticity and strength. The use of elastic tissue, which requires very little blood supply, economises the use of muscle, which requires a large blood supply. There is a good illustration of this in the ligamentum nuchæ of quadrupeds. This runs from the lower part of the neck to the back of the head. After the cow's head has been lowered in grazing, the resilience of the elastic ligament draws up the head without any muscular effort.

In the same way after bending forward and so putting the ligamenta subflava of the arches of the vertebræ on the stretch, we are saved considerable exertion on the part of the muscles of the back, by the elastic recoil of these ligaments. Yellow elastic tissue not only resists the action of acetic acid, but is incapable of digestion by the stomach.

Adipose tissue is a variety of connective-tissue, in which the substance of the connective-tissue corpuscles has become largely converted into fat. It is present in every part of the body, except the eyelids, the cavity of the cranium, and one or two other places. It is also absent from the substance of many organs. Under the microscope it is seen to consist of small cells imbedded in a mesh-work of connective-tissue. Each cell is about $\frac{1}{400} - \frac{1}{100}$" in diameter, and consists of a delicate bag enclosing fatty matter, which is liquid during life, but becomes solid after death. A nucleus is always present, but can only be rendered visible by dissolving the fat out of the cells by means of ether. (Fig. 10.) The oily matter in the cells consists of olein, palmitin, and stearin, which are combinations of glycerine with oleic, palmitic, and stearic acids respectively. Numerous capillary blood-vessels run into the adipose tissue.

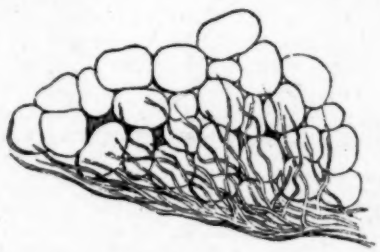


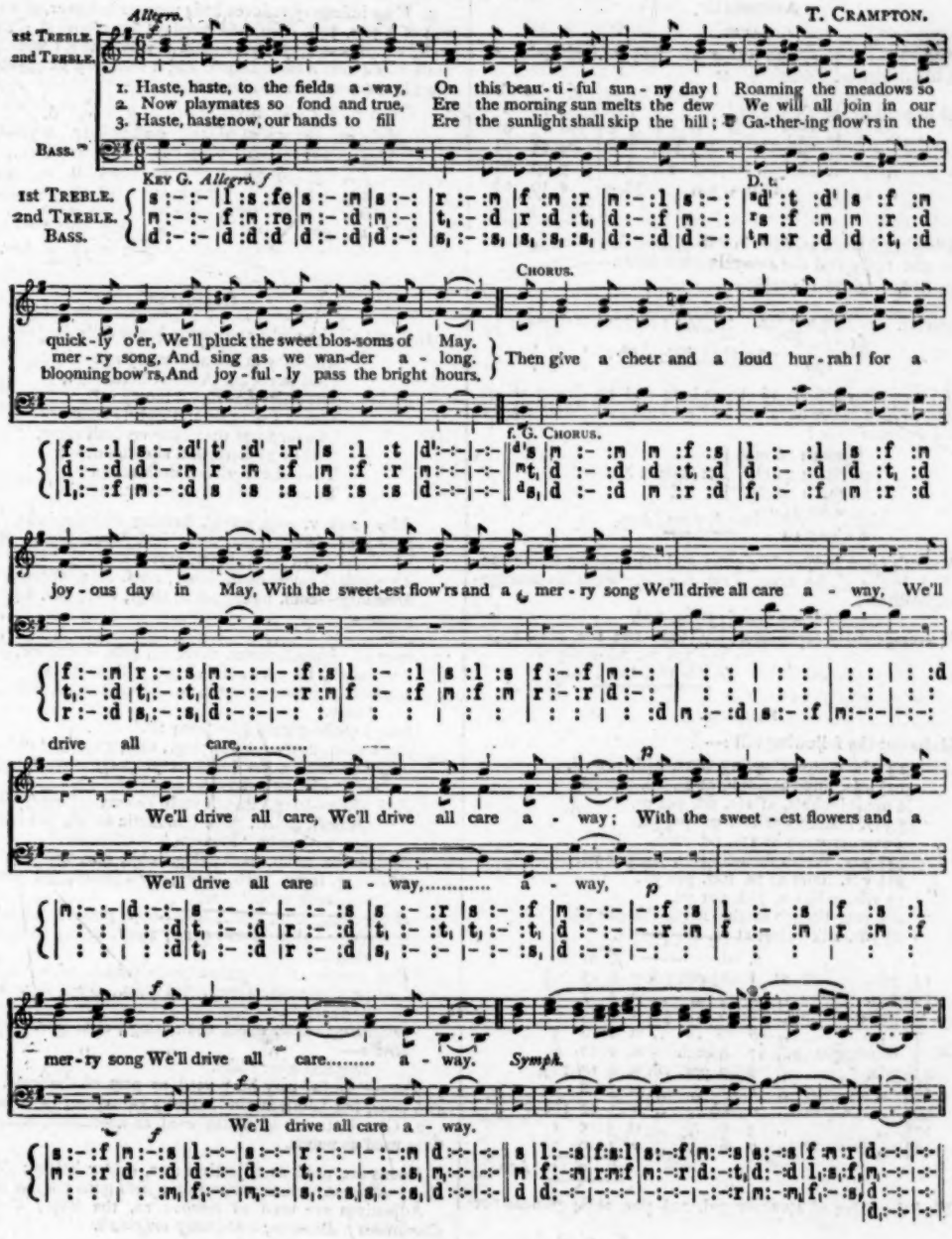
Fig. 10.—Adipose Tissue.

Adipose tissue serves important objects in the body. First, by its want of conducting power it prevents the excessive escape of heat from the surface of the body.

Second, it serves as a store of combustible material. which can be reabsorbed into the blood as required. This is very well shown in the case of the dormouse, It becomes very stout in the autumn, and during the long winter's sleep lives on its gradually diminishing store of fat; waking up in early spring thin and hungry.

Thirdly, fat serves to fill up spaces, to diminish angularities of features, to wrap up delicate structures, and to form a bed in which important organs can lie, (as in the case of the suet surrounding the kidneys). The sunken eyes following a severe illness show how the wasting of the fat in the orbits will give to the face a careworn and ghastly appearance. The same is shown in the attenuated hand and the general 'scraggy' look of emaciation.

(To be continued.)

MAY SONG.

Allegro.
T. CRAMPTON.
1st TREBLE.
2nd TREBLE.
BASS.
1. Haste, haste, to the fields a - way, On this beau - ti - ful sun - ny day! Roaming the meadows so
2. Now playmates so fond and true, Ere the morning sun melts the dew We will all join in our
3. Haste, haste now, our hands to fill Ere the sunlight shall skip the hill; Ga-ther-ing flow'rs in the
KEY G. Allegro. f
D. t.
CHORUS.
quick - ly o'er, We'll pluck the sweet blos-soms of May.
mer - ry song, And sing as we wan-der a - long.
blooming bow'rs, And joy - ful - ly pass the bright hours.
Then give a cheer and a loud hur - rah! for a
f. G. CHORUS.
joy - ous day in May, With the sweet-est flow'rs and a mer - ry song We'll drive all care a - way, We'll
drive all care,.....
We'll drive all care, We'll drive all care a - way; With the sweet - est flowers and a
We'll drive all care a - way,..... a - way,
mer - ry song We'll drive all care..... a - way.
Symph.
We'll drive all care a - way.

ANSWERS TO

Pupil Teachers' Examination Papers.

MARCH 31st, 1883.

CANDIDATES.

Three hours and a half allowed.

Arithmetic.

MALES.

1. Find, by practice, the value of 798¼ oz. of gold, at £3 17s. 10½d. per oz.

	£	s.	d.
Value of 798¼ oz. at £3 per oz. =	2394	15	0
,, ,, ,, 15s. = ¼ at £3 =	598	13	9
,, ,, ,, 2s. 6d. = ⅛ ,, 15s. =	99	15	7½
,, ,, ,, 3d. = 1/40 ,, 2s. 6d. =	9	19	6½
,, ,, ,, 1½d. = ½ ,, 3d. =	4	19	9½
	£3108	3	8½

2. A bankrupt pays 3s. 6½d. in the £, and his assets amount to £666 16s. 1½d.; find the amount of his debts.

3s. 6½d. £666 16s. 1½d.
or or
170 far. : 640,135 far. :: £1 : amount of debts.

$$\frac{£1 \times 640135}{170} = £3765\ 10s.$$ Ans.

3. If 6 men mow a field, 16 chains long and 10 chains wide, in 4 days, in how many days would 8 men mow a field 24 chains long and 9 chains wide?

8 men : 6 men
16 ch. : 24 ch. } :: 4 da. : ?
10 ch. : 9 ch.

$$\frac{4 \text{ da.} \times 6 \times 24 \times 9}{8 \times 16 \times 10} = 4\tfrac{1}{10} \text{ days.}$$ Ans.

4. A man's gross income is £500; and after paying an income tax of 6½d. in the £, he saves £150 a year. Find his average daily expenditure.

6½d. × 500 = £13 10s. 10d.
∴ his average daily expenditure = £(500 − 163 10s. 10) ÷ 135
= £336 9s. 2d. ÷ 365
= £0 18s. 5½½d. Ans.

FEMALES.

1. Make out the following bill:—

13 yds. cotton sheeting at 1s. 4½d. per yd.
19½ yds. linen sheeting at 2s. 5d. per yd.
2 prs. blankets, at 16s. 6d. per pr.
3 prs. blankets at 18s. 9d. per pr.
3 counterpanes at 17s. 6d. each.
43½ yds. Welsh flannel at 2s. 3d. per yd.
37⅛ yds. linen at 1s. 10d. per yd.
39 yds. calico at 9½d. per yd.
17¾ yds. French merino at 3s. 8d. per yd.
2¼ yds. silk velvet at 7s. 6d. per yd.

		s.	d.		£	s.	d.
13	yds. at	1	4½	per yd. =	0	17	10½
19½	yds. ,,	2	5	,, ,, =	2	7	1½
2	pairs ,,	16	6	,, pr. =	1	13	0
3	,, ,,	18	9	,, ,, =	2	16	3
3	counterpanes ,,	17	6	each =	2	12	6
43½	yds. ,,	2	3	per. yd. =	4	17	10½
37⅛	,, ,,	1	10	,, ,, =	3	8	9
39	,, ,,	0	9½	,, ,, =	1	10	10½
17¾	,, ,,	3	8	,, ,, =	3	5	1
2¼	,, ,,	7	6	,, ,, =	1	0	7½
					24	9	11½ Ans.

2. Find the value of 17 acres 3rd. 22½ per. at 84 guineas per acre.

	£	s.	d.
Value of 1 ac. =	88	4	0
			17
,, 17 ac. =	1499	8	0
,, 2 rd. = ⅛ val. of 1 ac. =	44	2	0
,, 1 ,, = ⅛ ,, 2 rd. =	22	1	0
,, 20 per. = ⅛ ,, 1 ,, =	11	0	6
,, 2½ ,, = ⅛ ,, 20 per. =	1	7	6½
	£1577	19	0½ Ans.

3. 19,251 at 18s. 5½d. each.

	£	s.	d.	£	s.	d.
Value of 19,251 at £1 each				= 19,251	0	0
Deduct ,, 19,251 at 1s.	962	11	0			
,, ,, 6d.	481	5	6	1483	18	7½
,, ,, ½d.	40	2	1½			
Value of 19,251 at 18s. 5½d.				= 17,767	1	4½

4. If an infirmary relieves 8764 persons in a year, at an average cost of £3 5s. 7½d. each, and employs 3 surgeons at £200 a year each, 5 nurses at £37 a year each, a porter at £1 weekly, 6 servants at £4 10s. a month each, and a secretary at £300 a year, what is the annual expenditure?

	£	s.	d.		£	s.	d.	
8764 at	3	5	7½	=	28,756	17	6	yearly.
3 ,,	200	0	0	=	600	0	0	,,
5 ,,	37	0	0	=	185	0	0	,,
1 ,,	1	0	0	per wk. =	52	0	0	,,
6 ,,	4	10	0	,, mo. =	324	0	0	,,
1 ,,	300	0	0	=	300	0	0	
					30,217	17	6	Ans.

Grammar.

1. Parse all the verbs and nouns in the following:—

'And may at last my weary age
Find out some peaceful hermitage,
The hairy gown and mossy cell,
Where I may sit and rightly spell
Of every star that Heaven doth shew,
And every herb that sips the dew;
Till old experience doth attain
To something like prophetic strain.'

May—aux. v. *may, might*, forming with the infin. 'find.'
may find—irreg. trans. verb, *find, found, found*, pot., pres. indef., 3rd pers., sing., agr. with subj. 'age.'
age—abstr. noun, neut., sing., nom. subj. of 'may find.'
hermitage—com. noun, neut., sing., obj., gov. by 'find.
gown— ,, ,, ,, ,,
cell— ,, ,, ,, ,,
may sit—irreg. intrans. verb, *sit, sate*, or *sat, sat*, pot., pres. indef., 1st pers., sing., agr. with subj. 'I.'
spell—reg. intrans. (trans. with 'of') verb, infin., gov. by 'may.'
(*may*) *spell*—parsed like 'may sit.'
star—com. noun., neut., sing., obj., gov. by 'of.'
Heaven—com. noun (used as proper), neut., sing., nom., subj. of 'doth show.'
doth show—irreg. trans. verb (*show, showed, shown*, or *shewed*), indic., pres. (emphatic form), 3rd pers., sing., agr. with subj. 'Heaven.'
herb—com. noun, neut., sing., obj., gov. by 'of.'
sips—reg. trans. verb, indic., pres. indef., 3rd pers., sing., agr. with subj. 'that.'
dew—com. noun, neut., sing., obj., gov. by 'sips.'
experience—abst. noun, neut., sing., nom., subj. of 'doth attain.'
doth attain—reg. intrans. verb (trans. with 'to'), indic., pres. (emph. form), 3rd pers., sing., agr. with 'experience.'
something—abst. noun, neut., sing., obj., gov. by 'to.'
strain— ,, ,, ,, to be supplied after 'like.'

Note.—'Doth' may be parsed as part of the irreg. verb *do, did, done*, but 'doth attain' is really equivalent to 'attains.'

2. Give instances of nouns used as adjectives, and of adjectives used as nouns.

Nouns are used as adjectives: as, *copper* kettle; *Devonshire* clay; *Worcester* sauce; *iron* ring; *field* guns; a *foot* race.
Adjectives are used as nouns: as, the *deep*; the *future*; *Christians*; *Romans*; *extremes*; *originals*.

3. Distinguish between strong and weak verbs.

Strong verbs form their past tense by a modification of the vowel of the present, and their past participle ends (or used to end) in -n or -en: as, *eat, ate, eaten*; *know, knew, known*; *lie, lay, lain*; *awake, awoke, awoke*.

Weak verbs form their past tense and past participle by adding -d or -ed or -t to the present: as, *love, loved, loved*; *turn, turned, turned*; *keep, kept, kept*.

Geography.

Answer two Questions.

1. Trace minutely (in words) the courses of the Tweed, the Medway, and the Dee, describing the country they flow through, and naming, at the proper points, their confluences with other rivers, and the towns on their banks.

The *Tweed* rises near Hart Fell, flows N.E. till joined by the Lyne from the Pentland Hills. It then turns S.E., receiving the Ettrick (with its tributary, the Yarrow). It then flows N. to be joined by the Gala, turns E., and receives the Leader, or Lauder; and making a bend, the river flows on to Berwick, receiving in succession the Teviot from Roxburgh, the Till from England, and the Black and White Adders from the Lammermairs. It passes the towns of Peebles, Melrose, Kelso, Coldstream, and Berwick. Selkirk stands on the Ettrick; Hawick on, and Jedburgh near, the Teviot; Galashiels on the Gala; Flodden on the Till. The Tweed winds through a plain of the richest soil in Scotland. Its course was marked in old days by some of the finest and most famous Scotch abbeys. From the south it gathers in a number of small streams that come to it through dales, famous in poetry and the wild stories of border life.

The *Medway* flows through Kent, passing Tunbridge, Maidstone, Rochester, and Chatham, and falls into the Thames at Sheerness. Below Rochester the estuary widens out considerably, and forms an important harbour for the British navy. Numerous arms of the river penetrate the marshes which spread inland to a considerable extent from the banks of the stream. Its upper course embraces a succession of beautiful scenery. A great number of sheep are fattened on the rich grass along its borders. Its branch called East Swale encircles the island of Sheppey at its mouth.

The *Dee* rises in Merionethshire, forms Bala Lake, passes by Bala, Llangollen, Bangor, Aldford, and Chester; whence it proceeds by a straight artificial cut to the broad estuary of the Dee. It is navigable to Bangor for barges, and to Chester for large vessels.

2. Name any towns in England which have grown up during the last 30 or 40 years; describe their situation, and give reasons for their growth.

Middlesborough, in the North Riding of Yorkshire, stands on the estuary of the Tees. It owes its growth to its being the centre and port of the Cleveland iron district.

Barrow-in-Furness stands in the small peninsula of Furness, Lancashire. From being a small fishing village in 1840 it has, from the discovery of enormous beds of iron-ore, risen to a town of some 50,000 of a population.

3. Describe minutely the coast between Belfast Lough and Donegal Bay. *If you can*, draw a map of this portion of the coast-line.

From Belfast Lough, proceeding in a north-westerly direction, we skirt the coast of Antrim, passing L. Larne, Fair Head (about fourteen miles from Cantire), between Rathlin I. and the mainland, Bengore Head, and reach the Giant's Causeway, a wonderful collection of basaltic columns. After passing Port Rush, we arrive at the coast of Londonderry, which is separated from the neighbouring county, Donegal, chiefly by the capacious Lough Foyle. On the Donegal side of the Lough stands Moville, a place of call for American steamers. The coast of Donegal is one of the wildest in Ireland. Malin Head is the most northerly point of the county and also of Ireland. The northern and western coasts are very much broken, but form a high and rocky barrier to the waves of the Atlantic. Its inlets are L. Swilly, Sheephaven, Guybarra Bay, and Donegal Bay. Several islands lie off the coast, the principal being North Arran.

Composition.

Write the following passage from dictation:—

Neither a bold, | nor a diversified country, | and withal an untidy country, | but pleasant enough to ride in, | when the paved roads | over the flats | are not too deep in black mud. | A country so sparely inhabited | that I wonder | where the peasants | who till and sow and reap the ground | can possibly dwell, | and also by what invisible balloons | they are conveyed | from their distant dwellings to and fro. | The occasional few poor cottages | and farms | cannot afford shelter | to the numbers | necessary to the cultivation, | although the work is done | so very deliberately. | A good custom they have | of prolonging the sloping tiled roof | of the homesteads | three or four feet, | so that it makes a good drying place | to hang up either herbs | or agricultural implements. | Little whitewashed black holes of chapels, | with barred doors | and Flemish inscriptions, | abound at roadside corners.

Penmanship.

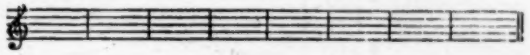
Write, in large hand, as a specimen of copy-setting, the word *Desdemona*.

Write, in small hand, as a specimen of copy-setting, *He wept when at Philippi he found Brutus slain.*

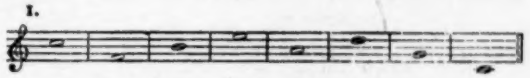
Music.

A quarter of an hour allowed for this paper.

1. Write down the following notes, C (*Do*), F (*Fa*), B (*Si*), E (*Mi*), A (*La*), D (*Re*), G (*Sol*), C (*Do*), as semibreves.



1.

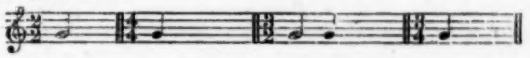


2. Write against each of the following the answer required.

(1) How many semiquavers are equal to a crotchet?
(2) How many quavers are equal to a minim?
(3) How many crotchets are equal to a semibreve?
(4) How many demisemiquavers are equal to a quaver?

2. (1) Four. (2) Four. (3) Four. (4) Four.

3. Fill up each of the following bars with the rests required to complete them.



3.

FIRST YEAR.

Three hours and a half allowed.

Arithmetic.

MALES.

1. Find the value of $3\frac{5}{12} - 7\frac{1}{8} + 4\frac{1}{2}$ of $3\frac{1}{3} - 6\frac{1}{4}$.

(*a*) $3\frac{5}{12} + 4\frac{1}{2}$ of $3\frac{1}{3} = 3\frac{5}{12} + 13\frac{1}{3} = 16\frac{25+52}{60} = 17\frac{17}{60}$

(*b*) $7\frac{1}{8} + 6\frac{1}{4} \quad = 13\frac{9+11}{24} \quad = 13\frac{1}{3} \quad = \underline{13\frac{1}{3}}$

Diff. between (*a*) and (*b*) $= \underline{3\frac{5}{12}}$. Ans.

2. Divide the difference between the greatest and least of $\frac{17}{21}$, $\frac{11}{15}$, $\frac{13}{18}$, $\frac{19}{24}$, by the sum of the other two.

(*a*) $\frac{17}{21}, \frac{11}{15}, \frac{13}{18}, \frac{19}{24} = \frac{765, 792, 780, 760}{1080}$

(*b*) diff. between the greatest and least $= \frac{1}{1080}$

(*c*) sum of other two $= \frac{1}{1080}$

(*d*) result of (*b*) divided by (*c*) $= \underline{1\frac{1}{1}}$. Ans.

3. Find the value in money of 2·875 of £5 12s. 6d.; and reduce £·0225 to the decimal of half a guinea.

(*a*) 2·875 of £5 12s. 6d. $= £5\frac{1}{2} \times 2\frac{1}{4} = £\frac{1035}{64} = \underline{£16\ 3s.\ 5\frac{1}{4}d.}$ Ans.

(*b*) $\frac{£·0225}{10\frac{1}{2}s.} = \frac{·45s.}{10\frac{1}{2}} = \frac{·9}{21} = \frac{·3}{7} = \underline{·042857}$. Ans.

4. What sum diminished by ·625 of ·16 of itself will amount to 2s. $8\frac{1}{4}$d.?

(*a*) ·625 of ·16 $= \frac{1}{8}$ of $\frac{1}{4} = \frac{1}{32}$;

(*b*) 2s. $8\frac{1}{4}$d. is therefore $\frac{31}{32}$ of whole sum, which must be

$$\underline{2s.\ 8\tfrac{1}{4}d. \times 48} = \underline{2s.}$$ Ans.

FEMALES.

1. If 488⅞ lbs. of beef serve a crew of 23 men 17 days, how many days will 1881¼ lbs. serve a crew of 35 men?

$$\left.\begin{array}{l} 488\tfrac{7}{8} \text{ lbs.} : 1181\tfrac{1}{4} \text{ lbs.} \\ 35 \text{ men} : 23 \text{ men} \end{array}\right\} :: 17 \text{ days} : ?$$

$$\frac{17 \times 7525 \times 23}{1955 \times 35} = \underline{43 \text{ days.}} \quad \text{Ans.}$$

2. A person bequeathed £5707 10s. to be divided between his two sons, in the ratio of 5½ to 6½. What were their respective shares?

12 : 5½ :: £5707 10s. : one share

$$\frac{£5707\ 10s. \times 5\tfrac{1}{2}}{12} = \underline{£2615\ 18s.\ 9d.} \quad \text{Ans.}$$

Therefore the other = £3091 11s. 3d. Ans.

3. The liabilities of a bankrupt are set down at £36,757 10s., and the assets at only £12,175 18s. 5½d.; what dividend will he be able to pay?

£36,757 10s. = 35,287,200 farth.
12,175 18s. 5½d. = 11,688,885 farth.

∴ 35,287,200 farth. : 11,688,885 farth. :: £1 : dividend.

$$\frac{£11{,}688{,}885}{35{,}287{,}200} = \underline{6s.\ 7\tfrac{1}{4}d.} \quad \text{Ans.}$$

4. If 42 casks of biscuits, each containing 60 lbs., serve 18 men during a voyage of 16 weeks, how long will 48 casks, each containing 70 lbs., serve 24 men, the daily allowance of the latter crew being four-fifths of that of the former?

$$\left.\begin{array}{l} 42 \text{ casks} : 48 \text{ casks} \\ 60 \text{ lb.} : 70 \text{ lb.} \\ 24 \text{ men} : 18 \text{ men} \\ 4 : 5 \end{array}\right\} :: 16 \text{ wks.} : ?$$

$$\frac{16 \text{ wks.} \times 48 \times 70 \times 18 \times 5}{42 \times 60 \times 24 \times 4} = \underline{20 \text{ wks.}} \quad \text{Ans.}$$

Grammar.

1. Parse all the pronouns and adverbs in the following:—

'To the Ocean now I fly,
And those happy climes that lie
Where Day never shuts his eye,
Up in the broad fields of the sky;
There I suck the liquid air
All amidst the gardens fair
Of Hesperus.'

I—pers. pron., 1st. pers., sing., mas. or fem., nom., subj. of 'fly.'
now—adv. of time, mod. 'fly.'
that—simple rel. pron., referring to 'climes,' 3rd pers., plur., neut., nom., subj. of 'lie.'
never—neg. adv. of time, mod. 'shuts.'
his—pronom. poss. adj., qual. 'eye'; or poss. sing. of 3rd pers., pron., mas., attrib. to 'eye.'
up—adv. of place, mod. 'lie.'
there— ,, ,, 'suck.'
I—same as before, subj. of 'suck.'
all—adv. of deg., mod. the phrase, 'amidst the gardens.'
Where is equivalent to both an adv. and a conj., mod. 'shuts,' and joins the sentence in which it stands with the preceding one.

2. Give instances of (*a*) Simple Prepositions. (*b*) Compound Prepositions. (*c*) Prepositions formed from nouns. (*d*) Verbal Prepositions.

(*a*) Simple Prepositions—*in, on, at, by, near, of.*
(*b*) Compound Prepositions—*over, upon, into, around, within.*
(*c*) Prepositions formed from nouns—*aboard* (=on board), *across* (=on the cross), *inside, outside, abreast.*
(*d*) Verbal Prepositions—*except, during, touching, saving, save.*

3. Make a list of Indefinite Pronouns.

Indefinite Pronouns—*some, any, one, all, such, other, divers, several, few.*

Geography.

Answer two questions.

1. Draw a map of the coast of Ireland, from Belfast Lough to Donegal Bay. Insert the lines of latitude and longitude.

2. Describe fully the rivers rising in the Alps, tracing their courses from source to mouth, mentioning their confluences with other rivers, and the towns on their banks.

(*a*) The *Rhine* has its main source in Mt. St. Gothard, passes through the magnificent ravine of the Rheinwald, unites with a second head-stream, and flows through a beautiful valley to Lake Constance. After leaving this lake it forms the celebrated falls of *Schaffhausen*, and winding between lofty rocks is joined by the *Aar* and reaches *Basle*. At this town the river turns north, flowing through a rich open valley, and before it reaches Mentz it is joined by the *Neckar* from the Black Forest, and the *Mayne* from the Fichtelberg in the N.E. of Bavaria. After leaving Mentz it flows west for a short distance through an unbroken succession of picturesque scenery, and then turns N.W. until it enters the flats of Holland. Before this, however, it is joined by the *Moselle* from the Vosges Mts. on the left, and by the *Lahn, Ruhr*, and *Lippe*. Entering Holland, it immediately divides into two branches, the southern and larger called the *Waal*, which flows west and joins the *Maas;* whilst the other, called the *Rign* (Rhine), flows N.W., and, after dividing into several other branches, falls into the North Sea below *Leyden*. Just after entering Holland the Rhine throws off a branch called the *Yssel*, which falls into the Zuyder Zee; and half-way between Utrecht and Leyden the *Amstel* leaves the main stream, and flows into the estuary called the Y. The delta of the Rhine is the largest in Europe, and the length of the river is at least 800 miles. The towns on the main stream, in order, are:—*Constance, Basle, Strasbourg, Carlsruhe, Spires, Mannheim, Worms, Mentz, Coblentz, Bonn, Cologne, Nimeguen (Waal), Zutphen (Yssel), Rotterdam, Utrecht, Amsterdam (Amstel).*

(*b*) The *Rhone* also rises in Mt. St. Gothard, flows S.W. to its confluence with the *Drance* at Martigny, passes through Lake Geneva, and enters the Perte du Rhone, flows past Mt. Cenis, and bends W. to join the Saône. From the confluence of the *Saône* to the Mediterranean, the Rhone flows S., and receives, on its left bank, the *Isere* and *Durance*, on its right the *Ardèche*. The Rhone enters the Mediterranean by four mouths. The towns on its banks are:—*Lausanne, Geneva, Lyons, Valence, Avignon, Beaucaire.*

(*c*) The *Po* rises in Mt. Viso, in the Alps, flows east through the plain of Lombardy, and is joined by the *Sesia, Tanaro, Ticino*. For a considerable portion of its course it forms the boundary between *Lombardy* and *Piedmont*. Continuing E., the Po is joined by the *Trebbia* and the *Adda*, forms a delta, and falls by several mouths into the Adriatic. The chief towns on its basin are:—*Turin, Aosta, Casale, Asti, Alessandria, Pavia, Milan, Piacenza, Como, Cremona, Parma, Mantua, Modena, Ferrara.*

3. Name six important towns—*not* capitals—in Germany; describe their situation, and say why you think each of them important.

Hamburg, on the Elbe, is the greatest entrepôt and most active financial centre of Northern Europe.

Danzig, at the mouth of the Vistula, is the principal port, with great grain trade.

Frankfurt, on the Main, was the former seat of the Diet, and has a vast commerce.

Bremen, on the Weser, a free city, has an extensive trade with America, and is one of the principal emigration ports.

Strassburg is a fortified city on the Rhine, and has a noble cathedral. The fortress capitulated to the Germans in 1870 after a siege of more than a month.

Metz, at the confluence of the Moselle and Seille, surrendered to the Germans in 1870. It is strongly fortified.

History.

1. Write down the names and dates of our kings from Edmund Ironside to Edward the Confessor.

			A.D.
Edmund II. (Ironside)	began to	reign	1017
Canute	,,	,,	1017
Harold	,,	,,	1036
Hardicanute	,,	,,	1039
Edward the Confessor	,,	,,	1041

2. Make a list of our sovereigns from 1180 to 1300, with their dates.

			A.D.
Henry II.	was reigning	in	1180
Richard I.	began to reign	in	1189
John	,,	,,	1199
Henry III.	,,	,,	1216
Edward I.	,,	,,	1272 (deposed 1307)

3. 'On April 5, 1706, died John Bales, of Northampton, button-maker, aged 130 and some weeks'; during what reigns did J. Bales live? Give the dates.

He must have been born in 1576, and therefore lived in the reigns of Elizabeth (1558–1603), James I. (1603–1625), Charles I. (1625–1649), Charles II. (1660–1685), James II. (1685–1688), William III. and Mary II. (1689–1702), and part of Anne's reign (1702–1714). The Commonwealth intervened between 1649 and 1660.

Penmanship.

Write, in large hand, as a specimen of copy-setting, the word *Desdemona.*

Write, in small hand, as a specimen of copy-setting, *He wept when at Philippi he found Brutus slain.*

Composition.

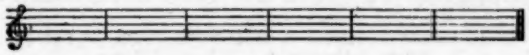
Write from memory the substance of the passage read to you by the Inspector.

A French actress recently bought a very fine specimen of the Turkestan bear for 1,500 francs, and having placed him in a cage, applied herself diligently to his education. He made such progress in good manners that, at the end of a month, she placed her garden at his disposal. But a poor old woman, happening to venture into the garden, was embraced by the black monster with such extreme cordiality that, on being rescued from his arms, she had to be taken to the hospital. The Prefect of Police will have to make the actress understand that her bear's education is not yet sufficiently advanced for him to be allowed the run of her garden.

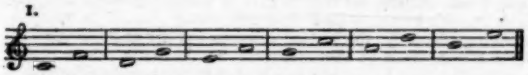
Music.

A quarter of an hour allowed for this paper.

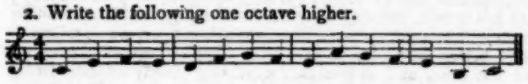
1. Write out the perfect fourths (or *major* fourths as they are sometimes called) found between the notes of the scale of C (*Do*).



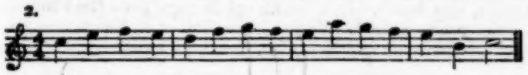
1.



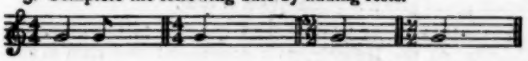
2. Write the following one octave higher.



2.



3. Complete the following bars by adding rests.



3.

SECOND YEAR.

Pupil Teachers at end of Second Year.

Three hours and a half allowed for this Paper.

Arithmetic.

MALES.

1. At what rate per cent. per annum will £1750 12s. 6d. amount in ten years to £2363 6s. 10½d. at simple interest?

Interest on £1750 12s. 6d. = £612 14s. 4½d.

$$\therefore \left.\begin{matrix} £1750\tfrac{1}{2} : £100 \\ 10 \text{ yrs.} : 1 \text{ yr.} \end{matrix}\right\} :: £612\ 14s.\ 4\tfrac{1}{2}d. : \text{rate.}$$

$$\frac{£612\ 14s.\ 4\tfrac{1}{2}d. \times 100 \times 8}{14005 \times 10} = £3\tfrac{1}{2}. \text{ Ans.}$$

2. Find the compound interest on £3750 for 3½ years at 4 per cent. per annum.

4 per cent. = $\frac{1}{25}$, or $\frac{1}{25}$ of principal for interest at the end of the year, and $\frac{1}{50}$, or $\frac{1}{50}$ for half a year.

	£		
$\frac{1}{25}$	3750		
	150		
$\frac{1}{25}$	3900	Amount for	1 year.
	156		
$\frac{1}{25}$	4056	,,	2 years.
	162·24		
$\frac{1}{25}$	4218·24	,,	3 ,,
	84·3648		
	4302·6048	,,	3½ ,,
Deduct	3750		
	552·6048	Compound interest for	3½ yrs.

∴ Compound interest = £552 12s. $1\frac{151}{625}$d. Ans.

3. In what time will the simple interest on £150 10s. at 4½ per cent. per annum amount to £9 9s. $7\frac{11}{25}$d.?

£4 10s. : £9 9s. $7\frac{11}{25}$d.?
or
$\left.\begin{matrix} 21\frac{1}{40}\text{d.} : 2\frac{113}{120}\text{d.} \\ £150 : £100 \end{matrix}\right\} ::$ 1 yr. : time.

$$\frac{1 \text{ yr.} \times 56889 \times 100 \times 2}{27000 \times 301} = 1 \text{ year } 146 \text{ days. Ans.}$$

4. A cask is filled with 32 gals. of spirits and 4 gals. of water; 3 gals. of the mixture are drawn off, and the cask is filled with water. Find the percentage of spirits and of water respectively in the last mixture.

$\frac{7}{8}$ or $\frac{7}{8}$ = proportion of spirits, and ∴ $\frac{1}{8}$ or whole = proportion of water.

By taking off 3 gals. of mixture, $\frac{3}{32}$ is drawn off; of which $\frac{21}{256}$ must be spirits and $\frac{11}{256}$ water.

$\frac{21}{256}$ taken from $\frac{7}{8}$ leaves $\frac{203}{256}$ as spirits,
$\frac{11}{256}$,, $\frac{1}{8}$,, $\frac{53}{256}$,, water,

∴ the percentage of spirits is $\frac{203}{256}$ of 100 = 81¼. Ans.

and ,, water is $\frac{53}{256}$ of 100 = 18¾. Ans.

FEMALES.

Three hours and a half allowed.

1. Find the least common multiple of 1426 and 989.

G.C.M. of 1426 and 989 = 23

$$\therefore \text{L.C.M.} = \frac{1426 \times 989}{23} = 61,318. \text{ Ans.}$$

2. Arrange the fractions $\frac{7}{11}$, $\frac{8}{15}$, $\frac{11}{14}$, $\frac{7}{18}$ in order of magnitude.

Reducing to C. D. $\frac{825,\ 1056,\ 720,\ 770}{1980}$

Hence, in order of magnitude, the fractions are $\frac{8}{15}$, $\frac{11}{14}$, $\frac{7}{18}$, $\frac{7}{11}$.

3. From the sum of 2½ and 5½ take the difference of 3½ and $4\frac{1}{15}$.

(*a*) $2\frac{1}{2} + 5\frac{1}{2} = 7 \quad \frac{9+10}{15} = 8\frac{4}{15}$

(*b*) $4\frac{1}{15} - 3\frac{1}{2} = 4\frac{2}{30} - 3\frac{15}{30} = \frac{17}{30}$

Difference between (*a*) and (*b*) = 7½. Ans.

4. What length must be cut off from a plank 13 feet 5½ inch long to leave a piece of 10 feet 6½ inches?

	ft.	in.
	13	5½
Deduct	10	6½
Rem. =	2	11 Ans.

Grammar.

1. Analyse the following passage, parsing the words in italics;—

'*Sing*, heavenly *Muse*, *that* on the secret top
Of Oreb or of Sinai *didst inspire*
That Shepherd, who *first* taught the *chosen* seed
In the beginning, how the heavens and earth
Rose out of Chaos.'

Sentence.	Kind.	Subject.	Pred.	Object.	Extensions.
(1)					
Sing, heavenly Muse.	Principal	(thou) heavenly Muse	Sing		
(2)					
That on the secret top of Oreb or of Sinai didst inspire that Shepherd.	Subord. adj. qualifying 'Muse'	that	didst inspire	that Shepherd	on the secret top of Oreb or of Sinai (*place*)
(3)					
Who first taught the chosen seed in the beginning.	Subord. adj. qualifying 'Shepherd'	who	taught	the chosen seed (indirect)	first (*time*) in the beginning (*time*)
(4)					
How the heavens and earth rose out of Chaos.	Subor. noun (direct obj. to 'taught')	the heavens and earth	rose		out of Chaos (*place*), how (connective) (*manner*)

Parsing.

Sing—irreg. intrans. verb, *sing, sang, sung*, imper., 2nd pers., sing., agr. with (thou).

Muse—prop. noun, fem., sing, nom., of address (or vocative).

that—simple rel. referring to 'Muse,' 2nd pers., sing., fem., nom. to 'didst inspire.'

didst inspire—(=inspiredst) reg. trans. verb, indic., past indef., 2nd pers., sing., agr. with subj. 'that.'

that—demonstr. adj, qual. 'Shepherd.'

first—adv. of time, mod. 'taught.'

chosen—complete part. used adjectively, qual. 'seed.'

rose—irreg. intrans. verb, *rise, rose, risen*, indic., past indef., 3rd pers., plur., agr. with subjects 'heavens' and 'earth.'

out—adv. of manner, mod. 'rose.' ('Out' is here rather a part of the prepositional phrase 'out of.')

2. Give instances of Conjunctions formed from—

(*a*) Pronouns,
(*b*) Nouns,
(*c*) Verbs,
(*d*) Adjectives.

(*a*) From Pronouns come *either, neither, whether, that.*
(*b*) From Nouns, *because* (=by cause), *while.*
(*c*) From Verbs, *except, seeing that, considering that.*
(*d*) From Adjectives, *both, otherwise, or* (shortened from *other*), *nor* (from *'nother*), *further, moreover, likewise.*

3. Write out notes of a lesson on 'Case.'

CASE.—From Lat. *casus*, a falling—an inflection of nouns and pronouns to show the relation which they bear to other words. (Show from examples on blackboard how easy it is to know the cases of *pronouns* like *I, mine, me, he, his, him*, even without seeing them in a sentence; but that it is impossible to tell the cases of *nouns* unless we see them in a sentence. Possessive case, however, easily known—*e.g.*, *John's* hat, *Mary's* bonnet, *Tom's* kite.)

POSSESSIVE CASE.—Formerly formed by adding *es*—thus *boy, boyes;* hound, houndes, etc.—afterwards *e* left out and (') apostrophe put in to mark the omission—(*compare e'er and e'en*)—possessive singular takes 's—possessive of plurals ending in *s* take (') only (*examples to be given*). Living beings only, as a rule, take the sign of the possessive—thus, not *the desk's top*, but *the top of the desk.*

NOMINATIVE AND OBJECTIVE CASES.—Not known by the look of them when belonging to nouns—*I have a book; A book lies here.* 'Book' has the same look in each sentence, but in the former it is the *object* of *have*, or in *objective* case, and in the second it is the subject of *lies*, or in the *nominative* case (a more appropriate name would be the *subjective* case); transitive verbs take an object after them—nominative found by asking the question Who? or What? with the verb; thus, 'I saw the boy.' *Who* saw the boy? *I, i.e.* the subject—objective case found thus: 'I saw whom' or 'I saw what'? Ans. *the boy;* therefore *boy* is the object or objective case governed by 'saw.' Objective case follows prepositions, as 'to him,' 'from me,' 'with John.' (*Exercises to be given from reading-books; examples dictated by scholars to be written by teacher on blackboard.*)

Geography.

1. Give notes of a lesson on the British Colonies in Australia, and illustrate your lesson by a full map. Insert the lines of latitude and longitude.

NOTES OF LESSON ON AUSTRALIA.

(*a*) *Position.*—Between 10° 40′ and 39° 12′ S. lat., and between 113° and 153° 39′ E. long. *Shape.*—Trapezoidal or of an irregular onion form. *Size.*—2500 miles from E. to W., 1970 miles from N. to S., area about 3,000,000 square miles, or ¼ less than Europe.

(*b*) British settlements and chief towns:—

New South Wales .	Sydney, Newcastle, Bathurst.
Victoria . . .	Melbourne, Geelong, Ballarat.
S. Australia . .	Adelaide, Kooringa.
W. Australia . .	Perth, Freemantle.
Queensland . .	Brisbane, Ipswich, Rockhampton.

(*c*) *New South Wales*—so named by Cook—founded 1788—a penal settlement at first—ceased to be such 1840—new life given to colony after discovery of gold 1851. *Victoria*—settled 1835—first called Australia Felix—colonists came from Tasmania—discovery of gold caused a great influx of adventurers—soon became the foremost of Australian colonies. *S. Australia*—proclaimed a colony 1839—suffered much from over-speculation—assisted by Home Government—discovery of copper mines at Burra-Burra hastened its prosperity. *W. Australia*—settled 1829—called first Swan River Settlement—from various causes has not been so prosperous as the other colonies. *Queensland*—proclaimed a colony 1859—formerly part of New South Wales, and called Moreton Bay Settlement.

(*d*) The mountain ranges of Australia are all on or near the coast, and this fact combined with the impassable character of these chains, and the uninviting nature of the interior, caused the settlements to be founded along the seaboard, where there are many rivers and general fertility.

(*e*) Its seasons the reverse of ours—being nearer the equator than Great Britain, its temperature is much higher—monsoons blow in the northern half—westerly winds prevail in south—speaking generally, the settled districts are dry and healthy—in New South Wales, Victoria, and S. Australia, these three peculiarities may be noted: (1) *long droughts*, very destructive; (2) hot *winds*, blowing from the interior; (3) sudden transition from heat to cold. *Productions.*—Gold, copper, wool, tallow—land better suited for pasture than tillage—vegetation goes on all the year, and is peculiar, consisting chiefly of gum trees, acacias, and heaths—food plants of Europe have been introduced—native animals nearly all pouched—*e.g.*, kangaroo—remarkable birds are lyre-bird, emu, and black swan.

2. Name the chief seaports in British Colonies in Asia and America, and give a full description of each.

The chief seaports in the British Colonies in Asia are:—(1) *Calcutta*, on the Hooghly, as a commercial emporium is unrivalled in Asia; European portion clean and healthy, native portion dirty; a magnificent city with a million inhabitants. (2) *Bombay*, one of the most populous cities of India, on the island of Bombay, connected with the mainland by an artificial causeway; harbour landlocked and safe at all times; its trade second only to Calcutta. (3) *Madras*, on the Coromandel coast, third for population in India; its commerce has suffered for want of a harbour; a pier lately erected under great engineering difficulties. (4) *Singapore*, on Malay Peninsula, has rapidly risen to importance as a great commercial entrepôt for the goods of Europe and Asia. (5) *Colombo*, in Ceylon, is the chief seaport of the island, strongly fortified, and an entrepôt for most of the foreign trade.

In America the chief seaports are:—(1) *Quebec*, principal stronghold in Canada; the great entrepôt for the trade of the dominion with Great Britain, the West Indies, etc.; has extensive shipbuilding. (2) *Montreal*, the largest, handsomest, and most commercial city in Canada, is situated on an island in the St. Lawrence, and is the centre of an extensive railway system, and the natural outlet for the products of the vast grain countries which border the great lakes. (3) *Halifax* is the nearest port to Great Britain, capital of Nova Scotia; has one of the finest harbours in the world; and the principal naval station of the British army and navy in North America. (4) *Kingston*, in Jamaica, is the chief commercial town, with great trade and steam communication with England and several West Indian ports.

SECOND PAPER.

Two hours and a half allowed.

History.

1. What was the Norman Conquest? Mention any changes which it introduced into the laws and institutions of England.

The Norman Conquest was the overthrow of the Saxons under Harold II. and the acquisition of England by William, Duke of Normandy, who became William I. or the Conqueror (1066).

Among the laws and institutions introduced by the Normans were *Domesday Book*, a register of land; the *Curfew Bell* rung at eight o'clock every evening as a signal to put out fires; the *Forest-laws; Justices of the Peace; Courts of Chancery, Exchequer*, and *Common Pleas*. The *Feudal System* was improved and perfected under William I. He parcelled the land into knights' fees, each being such as would provide an armed band in time of war for forty days. These were distributed among the barons as tenants-in-chief who sub-let portions to the thanes, and these sub-let portions to the ceorls. Vassals and over-lords had respective obligations and rights.

2. Who were the Plantagenets? and how did they reach the English throne? Which King of this House do you most admire? Why?

The Plantagenets occupied the English throne after the House of Normandy. They were divided into the Houses of York and Lancaster by the usurpation of Henry IV. The first of this dynasty was Henry II., who succeeded to the throne on the death of Stephen (1154).

The Plantagenet most generally admired is Richard I., on account of his daring valour and muscular strength, his skill in music, and for his accomplishments in the poetry of the Troubadours. He was the perfect model of a feudal knight. His pardon and reward to the archer by whose hand he fell, for his bravery when brought as a prisoner before him, reveals the true secret of the existence and praise of the knightly feudalism which played so large a part in the history of human progress.

3. What caused the unpopularity of Richard II.? Describe his death.

The cause of the unpopularity of Richard II. was his weakness and incompetency as a sovereign, whose chief delight was in gorgeous and vain display. His fate was provoked by mingled tyranny and folly. The immediate cause of his downfall was the confiscation of the estates of the Duke of Lancaster. During Richard's absence in Ireland, the Duke of Hereford, who had been banished, returned to claim the confiscated estates of Lancaster, and by usurping the Crown, was proclaimed as Henry IV. The deposed king Richard was ordered to prison, and in February, 1400, he died in Pontefract Castle. It has always been believed that he died either by starvation or by the hand of an assassin.

Composition.

Write full notes of a lesson on *The Whale*.

THINGS TO BE SEEN.—*Picture of whale, whalebone, spermaceti.*

APPEARANCE AND STRUCTURE.—An aquatic animal; flappers instead of fins; resembles a fish, but differs from it by breathing with lungs (*explain*); warm-blooded; feeds its young with milk; head nearly half its whole length; throat so small as to enable it to swallow only the smallest fishes; tail horizontal to raise it to surface; eyes smaller than a cow's; no visible ear, but a hole admits sound; no teeth in common whale; some whales over 60 feet long and 40 feet round. (*Compare its length with that of the schoolroom.*)

WHERE FOUND.—Great Greenland whale found in Baffin's Bay and in Arctic Ocean; the spermaceti whale found in the Southern Ocean.

HABITS.—Whales feed on marine plants or animals; fond of their young; die when taken out of water; very voracious; live in flocks or shoals; very powerful when roused; destroy their enemy with their powerful tails.

VARIETIES, AND HOW CAUGHT, ETC.—The two most important varieties are the *Great Greenland Whale* and the *Cachalot*, or *Spermaceti Whale*. (*Describe a whale chase.*) When the whalers have, by means of harpoon (*explain*) and lance, secured their prey, they remove the blubber, or fat, which lies under the skin; and of this a large whale may yield 30 tons. The blubber is cut in pieces and put in barrels. The oil is extracted by boiling down the blubber in large coppers.

The sperm whale is furnished with large teeth, while the Greenland whale has plates of whalebone instead of teeth. When caught, a hole is made in the head of the sperm whale, and the whalers draw up the spermaceti in buckets.

PRODUCTS OF THE WHALE.—Whalebone obtained from the mouth of the animal is, properly speaking, not bone at all. It forms a fringe inside the jaws, and serves as a sort of sieve, by means of which the whale, having filled its huge mouth with water, retains the marine animals, and allows the water to escape. Whalebone, used for ribs of umbrellas and parasols; for insertion in corsets; for whip-handles; for brushes, and for stuffing. Spermaceti, used for candles and ointments. Sperm oil used for oiling machinery. Ambergris, the most valuable material obtained from the whale, is whitish waxy substance, with a musky odour, very expensive, costing a guinea an ounce. Teeth of sperm whale furnish a kind of ivory. Skin of white whale made into leather so strong as to resist musket shot.

Euclid.

MALES.

[All generally understood abbreviations for *words* may be used.]

1. Why are the following definitions insufficient? (1) A superficies is that which has length and breadth. (2) A plane angle is the inclination of two lines, which meet together. (3) A diameter of a circle is a line terminated by the circumference.

Definition (1) is insufficient in not stating distinctly that 'A superficies has *only* length and breadth.' The idea of *thickness* must be carefully excluded in defining a superficies. The second definition should state that the lines are 'straight' and 'not in the same direction,' as they might be in a position not to show an angle at all. The diameter of a circle must be a 'straight' line, 'pass through the centre, and be terminated *both ways* by the circumference.' Otherwise it might be a curved or any line terminated by the circumference.

2. If two angles, PQR, PRQ, of a triangle be equal to one another, the sides PQ, PR also which subtend, or are opposite to, the equal angles shall be equal to one another.

Prop. 6, Bk. I.

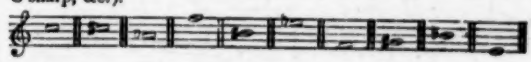
3. If two triangles have two angles of the one equal to two angles of the other, each to each, and one side equal to one side, namely, the sides adjacent to the equal angles in each, then shall the other sides be equal, each to each, and also the third angle of the one equal to the third angle of the other.

Prop. 26, Bk. I.

Music.

A quarter of an hour allowed for this exercise.

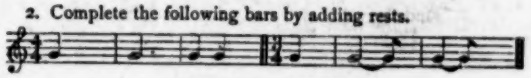
1. Write below each of the following notes its letter-name (C, C sharp, &c.).



1.

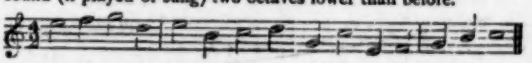
C C sharp A flat F B sharp E flat F G sharp. B flat E

2. Complete the following bars by adding rests.



2.

3. Write the following in the bass stave, so that it would sound (if played or sung) two octaves lower than before.



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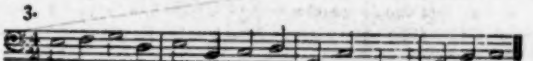


THIRD YEAR.

Pupil Teachers at end of Third Year, *if apprenticed on, or after,* 1st *May,* 1878; **and Pupil Teachers at end of Fourth Year,** *if apprenticed before that date.*

Three hours and a half allowed.

Arithmetic.

MALES.

1. A grocer mixes 3 cwt. of tea, which cost £40 10s. with 2 cwt., which cost £29 10s., and sells the mixture at 2s. 9d. per lb.; find the grain per cent.

	£	s.
3 cwt. cost	40	10
2 ,, ,,	29	10
∴ 5 ,, ,,	70	0
Now 5 cwt. or 560 lb. at 2¾s. bring	77	0
Total gain	7	

∴ 70 : 100 :: 7 : 10 gain p.c. Ans.

2. What sum must a man invest in the 3 per cents. at 97½ to secure an income therefrom of £150, the brokerage being ¼ per cent.?

£3 : £150 :: £98 : sum required.

$\frac{£98 \times 150}{3} = £4,900$ Ans.

3. A horse dealer, by selling a horse for £35, gains 25 per cent. on its cost price; what per cent. would he gain by selling it for £39 4s.

£35 : £39⅕ :: £125 : £100 + gain p.c.

$\frac{125 \times 196}{35 \times 5} = £140$ ∴ gain p.c. = 40. Ans.

4. Show that $\frac{4{\cdot}857142}{6{\cdot}18 \times {\cdot}083} = 9{\cdot}428571$.

$$\frac{4{\cdot}857142}{6{\cdot}18 \times {\cdot}083} = \frac{4\frac{6}{7}}{6\frac{2}{11} \times \frac{1}{12}} = \frac{34}{7} \div \left(\frac{68}{11} \times \frac{1}{12}\right) =$$

$$\frac{34 \times 11 \times 12}{7 \times 68} = \frac{66}{7} = 9{\cdot}428571.$$ Q. E. D.

FEMALES.

1. Divide to 4 places of decimals:—·39842 by 3·7164; and 281·5 by 13·789.

(a)

3·7164)·39842(·1072. Ans.
37164
267800
260148
76520
74328
.....

(b)

13·789)281·5(20·4148. Ans.
27578
57200
55156
20440
13789
66510
55156
113540
110312
.....

2. Find the value of

1·238 lbs. + 5·613 ozs. + 9·715 dwts. + 21·72 grs.

1·288 lbs. = 7130·88 grs.
5·613 oz. = 2694·24
9·715 dwt. = 233·16
21·72 grs. = 21·72
Total 10080· grs. = 1 lb. 9 oz. Ans.

3. What would be the cost of 27·248 acres at £93·75 per acre?

£93·75 × 27·248 = £2554·5 = £2554 10s. Ans.

4. Divide three times the sum of 4·0499 and ·4049 by four times the difference of 160 and 4·6.

$\frac{(4{\cdot}0499 + {\cdot}4049) \times 3}{(160 - 4{\cdot}6) \times 4} = \frac{13{\cdot}3644}{621{\cdot}6} = {\cdot}215$ Ans.

Grammar.

1. 'His *spear*, to equal *which* the tallest pine
Hewn on Norwegian hills, to be the mast
Of some great ammiral, *were but a wand*,
He walked *with* to support uneasy steps
Over the *burning* marle.'

2. Analyse the above lines.

3. Parse the words in italics.

SENTENCE.	KIND.	SUBJECT.	PREDICATE.	EXTENSIONS.
(1) His spear he walked with to support uneasy steps over the burning marle.	Principal	he	walked	With his spear to support uneasy steps over the burning marle (manner)
(2) To equal which the tallest pine hewn on Norwegian hills to be the mast of some great ammiral were but a wand.	Subord. adj. to 'spear'	the tallest pine to equal which hewn on Norwegian hills to be the mast of some great ammiral	were but a wand.	

PARSING.

spear—com. noun, neut., sing., obj., gov. by 'with.'
which—simple rel., referring to 'spear,' 3rd pers., sing., neut., obj., gov. by 'to equal.'
hewn—complete part. of the irreg. trans. verb *hew, hewed, hewn*, qual. 'pine.'
were—irreg. intrans. verb, *am, was, been*, subjunctive, past indef., 3rd pers., sing., agr. with 'pine.'
but—adv. of deg., mod. 'a.'
a—qual. adj., attrib. to 'wand' (indef. art., attrib. to 'wand.')
wand—com. noun., neut., sing., nom. after 'were'; in app. with 'pine.'
with—prep., gov. obj. case 'spear.'
burning—part. adj., qual. 'marle.'

4. The infinitive mood is used to express purpose. Point out any instance of this use of it in the above passage.

The infinitive 'to support uneasy steps,' shows the purpose of his walking with the spear.

5. Give the meaning of the prepositions of which the following words are compounded:—Innocent, subterfuge, abrupt, subordinate, implicate, propose, supernatural, adjacent, excessive, connection, predict, object, interpose.

WORDS.	PREPOSITIONS.	MEANING.
Innocent	in	not
subterfuge	subter	beneath
abrupt	ab	from
subordinate	sub	under
implicate	im for in	in or into
propose	pro	for
supernatural	super	over or above
adjacent	ad	near to
excessive	ex	out of, beyond
connection	con	together
predict	pre	before
object	ob	against
interpose	inter	between

One hour allowed for this Exercise.

Geography.

1. Draw a map of that part of Africa which lies to the west of the 10th meridian of east longitude. Insert the lines of latitude and longitude.

N.B.—*The 10th meridian passes close by Tunis, and cuts the equator a little to the N.E. of Cape Lopez.*

2. Give notes of a lesson on this statement:—'The chief watershed of Southern Hindostan is the chain called the

Western Ghauts.' Show, as to children, that this statement is true, by tracing the course of each of the principal rivers.

(*Map to be sketched on Blackboard.*)

The Western Ghauts, for about 1,000 miles along the Coucan and Malabar coasts from the valley of the Taptee to C. Comorin, form the water-parting between the Arabian Sea and the Bay of Bengal, constituting the W. wall of the Deccan. They present an abrupt face to the west and a gentle slope to the east. Vast quantities of moisture are deposited on them, and in them originate the following rivers:—

The Godavery rises near the N. end or the W. Ghauts, fifty miles from the sea, and flows to the S.E.

The Kistnah rises at Mahabuleshwar, only forty miles from the sea, and flows into the Bay of Bengal at Masulipatam.

The N. and S. Pennair rise in the tableland of Mysore, fall into the Bay of Bengal; the latter at Fort St. David.

The Cauvery rises in the district of Coorg, flows E. through Mysore and the Carnatic into the Bay of Bengal.

SECOND PAPER.

Two hours and a half allowed.

History.

1. Name the parents of Mary Queen of Scots, and show how each one of them was related to the Royal Family of England.

The parents of Mary Queen of Scots were James V. and Mary of Guise. James V. was nephew of Henry VIII., through his mother, Mary Tudor, daughter of Henry VII. Mary of Guise and James V. were the grand-parents of James I. of England.

2. After the death of Charles I. what form of government prevailed? Explain the subsequent readiness of the people to change back again.

After the death of Charles I. the Republican form of government prevailed, during which the Puritans had the upper hand. They committed the error of trying to make all men religious after their own pattern. The Long Parliament put down public amusements, forbade the keeping of Christmas and other ancient festivals, and assigned punishments of great severity to breaches of private morality. Religion, or the appearance of it, was made a qualification for office, and the result was that the name of Puritan became synonymous with that of hypocrite, and the unnatural restraint of the Commonwealth was succeeded at the Restoration by an outbreak of profligacy.

3. When did George IV. mount the throne, and when did he become Regent? Account for the prevalence of distress at this period, and mention any popular outbreaks.

George IV. ascended the throne in 1820 on the death of his father, George III., for whom he had acted as Regent, 1811.

The sudden change from war to peace after the Battle of Waterloo caused great distress, for bread was dear, while wages sank very low. The wheat crop of 1817 failed, and there was scarcely any foreign market for British manufactures. A corn law had been passed prohibiting the importation of foreign wheat until British wheat should have risen to 80s. per quarter. Disturbances and riots led to the adoption of strict provisions for repressing sedition. The *Luddites* (bands of workmen leagued to destroy stocking and lace frames) had first risen in 1812, but now revived with new violence. In 1819 a large open-air meeting in St. Peter's Field, Manchester, held with a view to obtain Parliamentary reform, was put down with bloodshed. This affair has since been commonly known as the 'Manchester Massacre.'

Composition.

Write from memory the substance of the passage read to you by the Inspector.

Havre, the port at the mouth of the Seine, is full and overflowing with cotton. Every coach-house and stable, every shed, are filled with cotton bales. Formerly, long trains of carts used to convey the cotton to mills in the interior, each cart made with two long poles laid across the axletree of two enormous wheels, the poles forming at once the body and the shafts. There was always a long-legged horse in the shafts, a stronger horse before him, and a clever little horse in front. When the carts had surmounted a hill, and were to descend the other side, the leading horse, and even the second also, if necessary, were detached from the front and attached to the rear. The remaining horse or horses in front were then made to advance, dragging the others backwards; if the downward pace became dangerously rapid, the horse or horses in the rear were flogged to excite them to greater resistance.

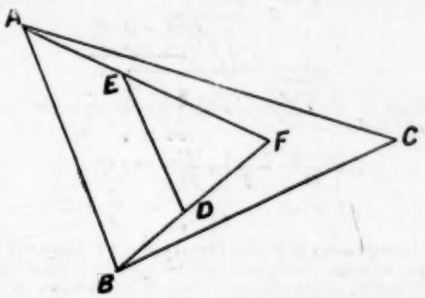
Euclid.

MALES.

[All generally understood abbreviations for *words* may be used.]

Answer two questions, including Question 1, *if you can.*

1. ABDE is a quadrilateral within the triangle ABC; the sides of the triangle are together greater than the sides of the quadrilateral.



Let ABC be the given triangle, and ABDE the quadrilateral. Produce AE, BD to F; then, since any two sides of a triangle are together greater than the third side EF, FD are greater than ED, and (by I. 21) AB, CB are greater than AF, FB. ∴ AC, CB are greater than AE, ED, DB, and ∴ the three sides AC, CB, BA must be greater than the four sides, AE, ED, DB, BA. —Q.E.D.

2. If a side of any triangle be produced, the exterior angle is equal to the two interior and opposite angles; and the three interior angles of every triangle are together equal to two right angles.

Prop. 32, Bk. I.

3. To describe a parallelogram that shall be equal to a given triangle, and have one of its angles equal to a given rectilineal angle.

Prop. 42, Bk. I.

Algebra.

MALES.

Answer two questions.

1. Define *co-efficient*, *index*, *least common multiple*, with examples.

Add together $(a^2-bc)x^2+(b^2-ac)y^2+(c^2-ab)z^2$ and $abc\left(\frac{x^2}{a}+\frac{y^2}{b}+\frac{z^2}{c}\right)$

Co-efficient is the number, whether whole or fractional, which is placed before a quantity as a multiplier, as 5 in $5a$, $5a$ in $5ax$. There may be both *literal* and *numerical co-efficients*.

An *index* is a number placed above a quantity to express the power of that quantity; it is also called the *exponent*; thus, 2 is the index of a in a^2.

If two or more algebraical expressions be arranged according to descending powers of some common letter, then the expression of lowest dimensions in that letter which is divisible by each of these expressions is their least common multiple; thus, the L.C.M. of a^2bd, ab^2c, bc^2d is $a^2b^2c^2d$.

$$\begin{array}{rl} (a^2-bc)x^2 = & a^2x^2 - bcx^2 \\ (b^2-ac)y^2 = & b^2y^2 - acy^2 \\ (c^2-ab)z^2 = & c^2z^2 - abz^2 \\ abc\left(\frac{x^2}{a}+\frac{y^2}{b}+\frac{z^2}{c}\right) = & +bcx^2+acy^2+abz^2 \\ \hline & a^2x^2+b^2y^2+c^2z^2. \text{ Ans.} \end{array}$$

2. Resolve $a^2+ab-12b^2$ and $a^2-5ab+6b^2$ into factors, and hence find their G.C.M. Also find the G.C.M. of $4x^3+5a^2x-21a^3$ and $2x^3+5ax^2-30a^2x+27a^3$.

(1) $(a^2+ab-12b^2)=(a+4b)(a-3b)$
$(a^2-5ab+6b^2)=(a-2b)(a-3b)$
∴ $(a-3b)$ is the G.C.M. Ans.

(2) $2x^3+5ax^2-30a^2x+27a^3)4x^3+5a^2x-21a^3(2$
$4x^3+10ax^2-60a^2x+54a^3$
$-5a\,|\,-10ax^2+65a^2x-75a^3$
$2x^2-13ax+15a^2$

$2x^2-13ax+15a^2)2x^3+5ax^2-30a^2x+27a^3(x+9a$
$2x^3-13ax^2+15a^2x$
$18ax^2-45a^2x+27a^3$
$18ax^2-117a^2x+135a^3$
$36a\,|\,72a^2x-108a^3$
$2x-3a$

$2x-3a)2x^2-13ax+15a^2(x-5a$
$2x^2-3ax$
$-10ax+15a^2$
$-10ax+15a^2$

$2x-3a$ = G.C.M. Ans.

3. What is the difference between an *equation* and an *identity?* Solve :—

(1) $\frac{x-7}{11}-\frac{3x-5}{7}+\frac{125}{77}=2x-17.$

(2) $(a+x)(b+x)-a(b+x)=\frac{a^2c}{b}+x^2.$

Such an expression as $(a+x)(a-x)=a^2-x^2$, where one of the quantities between which the sign of equality is placed results from performing the operations indicated in the other, is called an '*identity.*'

Such an expression as $ax+y=z$, where the quantity on one side of the sign of equality cannot be made to result from the other by performing the operations indicated in either, is called an '*equation.*'

(1) $\frac{x-7}{11}-\frac{3x-5}{7}+\frac{125}{77}=2x-17$

$7x-49-33x+55+125=154x-1309$

$7x-33x-154x=49-125-1309-55$

$180x=1440$

$x=8.$ Ans.

(2) $(a+x)(b+x)-a(b+x)=\frac{a^2c}{b}+x^2$

$a(b+x)+x(b+x)-a(b+x)=\frac{a^2c+bx^2}{b}$

$b^2x+bx^2=a^2c+bx^2$

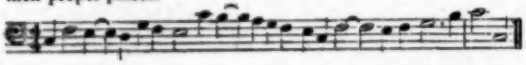
$b^2x=a^2c$

$x=\frac{a^2c}{b^2}.$ Ans.

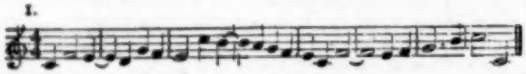
Music.

A quarter of an hour allowed for this paper.

1. Write the following in the treble stave, so that it would sound (if played or sung) one octave higher; and add bars in their proper places.



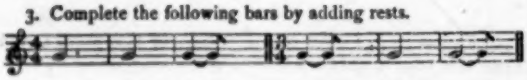
1.



2. Write the major thirds found between the notes of the scale of B flat.

2.

3. Complete the following bars by adding rests.



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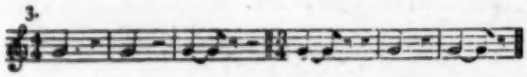


FOURTH YEAR.

Pupil Teachers at end of Fourth Year, *if apprenticed on, or after,* **1st May, 1878; and Pupil Teachers at end of Fifth Year,** *if apprenticed before that date.*

Three hours and a half allowed.

Arithmetic

MALES.

1. A person spends 10 per cent. of his money, and then 12 per cent. of the remainder, and has £5940 left; how much had he at first?

By spending 10 p.c. he has $\frac{9}{10}$ of whole left;
By spending 12 p.c. of remainder he has $\frac{88}{100}$ of $\frac{9}{10}$ or $\frac{99}{125}$ of whole remaining,

$\therefore$ 99 : 125 :: £5940 : his whole money.

$£\frac{5940\times125}{99}=£7500.$ Ans.

2. How much stock must a man sell out of the 3 per cents. at 97½ to buy £4500 worth of railway stock at 129½, a brokerage of ¼ per cent. being charged on each transaction?

97½ : 130 :: £4500 : stock required.

$£\frac{4500\times130}{97\frac{1}{2}}=£6000.$ Ans.

3. A broker invests a certain sum in the 3 per cents. at 97⅜ and afterwards sells out at 98¾, and gains thereby £27; what sum did he invest? (Omit brokerage.)

£97⅜ brings a gain of £1½

$\therefore$ 1½ : 27 :: £97⅜ : sum invested.

$£\frac{781\times27\times8}{8\times9}=£2343.$ Ans.

4. A train travels at the rate of 40 miles an hour for 10 minutes, and then at 45 miles an hour for 15 minutes; what is the average rate per hour for the whole time?

⅓ of 40 mls. = 6⅔
⅔ of 45 mls. = 11½

Total mls. in 25 min. = 17½ mls.

$\therefore$ 25 min. : 60 min. :: 17½ mls. : average rate.

$\frac{215\text{ mls.}\times60}{12\times25}=43$ miles. Ans.

FEMALES.

1. Find the time in which £487 10s. will produce £39 interest at 4 per cent.

487½ : 100 }
4 : 39 } :: 1 yr. : time

$\frac{1\text{ yr.}\times100\times39\times2}{975\times4}=2$ yrs. Ans.

2. A well is dug in 13 days of 9 hours each; how many days would it have taken of 10 hours each?

10 hrs. : 9 hrs. :: 13 da. : time

$\frac{13\text{ da.}\times9}{10}=17\frac{7}{10}$ days. Ans.

3. A travelling party of 3 spend £38 in 4 weeks; how long would £95 last a party of 5 at the same rate?

£38 : £95
5 per. : 3 per. } :: 4 wks. : time

$\frac{4\text{ wks.}\times95\times3}{38\times5}=6$ weeks. Ans.

5 Three partners furnish respectively £350, £290, and £160 capital in an undertaking; if the year's profits amount to £120, what share would each receive?

£(350+290+160) = £800

	£	s.		
350/800 of £120 =	52	10	1st share.	Ans.
290/800 ,, ,, =	43	10	2nd ,,	Ans.
160/800 ,, ,, =	24	0	3rd ,,	Ans.

Grammar.

'He led me to see all the remarkable places of this ancient Citty, *being one* of the largest, and certainly, after London, one of the *noblest* of England, *for* its venerable Cathedrall, number

of stately Churches, *cleannesse* of the streetes and buildings of flints so exquisitely *headed* and squared *as I was much astonished at*; but he *told* me they had *lost* the art of *squaring* the flints.' —EVELYN'S DIARY.

1. Point out in the above any difference of spelling or idiom from the English of to-day.

2. How many sentences are there in the above, and of what kind is each? Analyse the noun sentence in it.

3. Parse the words in italics.

1. In spelling 'Citty' we now use one 't'; in 'Cathedrall' one 'l'; we say 'cleanliness' for 'cleannesse'; and omit the final 'e' in 'streetes.' For 'led' we now say 'took'; instead of the participle clause 'being one' we use the relative, 'which is one'; we would insert 'cities' after 'noblest'; and for 'as I was much astonished at,' write 'that I was much astonished at it'; for 'squaring the flints' we omit the article and say 'squaring flints.'

2. There are four sentences in the passage :—

(1) 'He led me to see..... headed and squared.' *Principal.*
(2) 'As I was much astonished at.' *Subord. adverbial.*
(3) 'But he told me.' *Principal.*
(4) 'They had lost the art of squaring the flints.' *Subord. noun (dir. obj. of 'told').*

ANALYSIS OF NOUN SENTENCE.

They.....subject
had lost.....predicate
the art .....object
of squaring the flints.....enlargement of object.

PARSING.

3. *Being*—incomplete part. of the irreg. intrans. verb, *am, wis, been*, attrib. to 'Citty.'
one—indef. pron., referring to city, neut., sing., nom. after 'being.'
noblest—adj., sup. deg., qual. (*cities*), used as a noun, neut., plur., obj., gov. by 'of.'
for—prep., gov. obj. case 'buildings,' connecting 'noblest' and 'Cathedrall,' 'Churches,' 'cleannesse,' and 'buildings.'
cleannesse—abstr. noun, neut., sing., obj., gov. by 'for.'
headed—complete part. of the reg. verb 'head,' attrib. to 'flints.'
as—adv. conj., equivalent to a rel. pron., obj., gov. by 'at.'
I—pers. pron., 1st pers., sing., mas., nom., subj. of 'was astonished.'
was—aux. of voice
astonished—complete part. } pass. voice of reg. trans. verb 'astonish,' indic. past indef., 1st pers., sing., agr. with I.
at—prep., gov. 'as,' which is used as a rel. pron.
told—irreg. trans. verb, *tell, told, told*, indic. past. indef., 3rd pers., sing., agr. with 'he.'
lost—complete part. of irreg. trans. verb, *lose, lost, lost*, forming part of comp. tense.
squaring—gerund. of the reg. trans. verb 'square,' obj., gov. by 'of.'

4. There are two distinct classes of Latin words in English. (1) Those that have come indirectly from Latin through French. (2) Those that have come directly from the Latin. Illustrate this by examples.

English Derivatives direct from Latin.	*English Derivatives from Latin through French.*
ratio	reason
potion	poison
lection	lesson
tradition	treason
secure	sure
benediction	benison
oration	orison
persecute	pursue
penitence	penance
legal	loyal

Geography.

1. Draw a map of that part of Africa which lies to the west of the 10th meridian of east longitude. Insert the lines of latitude and longitude.

N.B.—*The 10th meridian passes close by Tunis, and cuts the equator a little the N.E. of Cape Lopez.*

2. Give notes of a lesson on 'The Gulf of Mexico, the Caribbean Sea, their Islands and Coast-Line.'

'THE GULF OF MEXICO, AND CARIBBEAN SEA.'

I. GULF OF MEXICO.—A mediterranean sea united by numerous straits with the Atlantic, from which it is separated by a row of islands and widely extended banks; the long chain of *Antilles* forms eastern boundary; and several small banks, with the Great and Little Bahama Bank, extend along northwards; and divided from Pacific Ocean by the Mexican Isthmus, which unites the two Americas; communicates with the Caribbean Sea by the Channel of Yucatan; north and west boundaries consist of the coasts of the United States and Mexico, which coasts are in general low, and skirted with flat sandy islands; its length and breadth are nearly 1000 miles each.

II. CARIBBEAN SEA.—Extends from east to west, nearly 2000 miles; average breadth, less than 500; lined with numerous reefs and low wooded islands, called *keys*, which are more numerous in the Mosquito Gulf and Bay of Honduras, thus rendering navigation difficult; along the north lie the important Islands of Cuba, San Domingo, Porto Rico, Jamaica (called the Greater Antilles); on the east are ranged the Lesser Antilles, divided into Leeward and Windward Islands; it is bounded on the west by the Peninsula of Yucatan and Central America; the narrow Isthmus of Panama separates it from the Pacific, and its south coast lies along part of South America.

III. GULF STREAM.—The distinguishing feature of the above seas is the Gulf Stream, so called from passing through the Gulf of Mexico. This stream is the local name of a section of the equatorial current of the Atlantic, which passes through the Windward Islands, across the Caribbean Sea, into the Gulf, which, with only two outlets, and hemmed in by mountains, is exposed to the full heat of a tropical sun. As the stream sweeps round the Gulf it becomes very hot, and is swollen by the waters of the Mississippi, till at length it forces its way out into the Atlantic between Florida and Cuba in a stream of from thirty to forty miles wide, and 600 or 700 feet deep, and at a speed of about eighty miles a day.

SECOND PAPER.

Two hours and a half allowed.

History.

1. How was land held under the Normans? What duties attended its occupation?

Under the Normans the king was the supreme lord of the land, with a few exceptions. The public land was held by feudal tenure. The possessions so held were called *fiefs*; and the possessor became the *vassal* of the king, who was the *feudal lord* or *suzerain*. The vassal was bound to follow the banner of his lord, with a force proportioned to the extent of his tenure, to assist him with his counsel, and to attend as an assessor in his courts of justice, besides other less important service. These great vassals were, in their turn, surrounded by a class of retainers, who owned them as their feudal lords. To such vassals the lord by what was called *sub-infeudation* parcelled out his estate, and administered justice to them in his own courts. A few lords that remained free from service to a suzerain were liable to other burthens for the public defence. Vassals received their *fiefs* from the feudal lord by *investiture*, taking an oath of *fealty* and doing *homage* to him for the fief.

2. Compare the means by which Henry IV., Henry VII., and William III. obtained the Crown.

Henry IV., when Duke of Hereford, had incurred the ill-will of Richard II. by taking part with the nobility to check his tyranny; and on the occasion of a duel with the Duke of Norfolk, was banished the realm. During his exile, he heard that Richard had seized his patrimony on the death of his father, John of Gaunt, and, availing himself of Richard's absence in Ireland, he landed in England, was joined by the people, with whom he was a favourite, and deprived his rival of the crown (1399).

Henry VII. was an exile in Brittany when the Duke of Buckingham, who had aided Richard III. in his usurpation, being discontented, invited him to join in an insurrection against the usurper. Buckingham, however, did not await his arrival, but rose, was taken, and executed, thus clearing off a formidable rival to Henry's claims. Henry landed in Wales, met Richard at Bosworth, where he gained the victory, and his opponent fell.

William III. was the successor of James II. by the Revolution of 1688. He was regarded by the Protestant world as the great champion of religious liberty. When the struggle was going on between James II. and the aristocracy, William was informed of every step that was taken, and held himself in readiness. When all was prepared, he sailed for Torbay; the abdication of James, the strifes in the Convention Parliament followed; and the Bill

of Rights and the Act of Settlement established him and his consort, Mary II., on the thrown of England.

3. What were the views of the Chartists? Describe any violent effort made to effect them, and explain the freedom of this country from similar efforts in later years.

The Chartists set forth their views in what they called the "People's Charter," in which they demanded: universal suffrage (excluding women), equal electoral districts, vote by ballot, annual parliaments, no property qualification for members, and payment for their legislative services.

After some rioting in 1839, the Chartists remained tolerably quiet until 1848, when they determined to make a show of their strength. They mustered in great numbers to carry a petition embodying their demands to the House of Commons. A rebellion was feared, and great precautions were taken by swearing-in special constables and by having troops in readiness, and the whole proceedings passed off quietly. From that time the Chartists ceased to be of any importance as an organised body.

In later years, violent agitation is seldom attempted by sensible and peace-loving citizens, as every facility for expressing their sentiments on all public questions is afforded by both the platform and the press, and the readiness of Parliament to remedy abuses, tends to satisfy the most disaffected.

Composition.

Write a short essay on *A Shipwreck*.

While staying in Yarmouth one very stormy night in September, I was aroused about eight or nine o'clock by some one knocking and calling at my door. On asking what the matter was, I was informed that a schooner from Spain or Portugal, laden with fruit and wine, was expected soon to become a wreck.

Wrapping myself up as quickly as possible, I ran for the beach, outstripping a good many who were running in the same direction. I was soon facing a sea whose breakers rose and rolled in a most appalling manner. I was so confused, that on looking for the wreck, I could see nothing but the foaming heads of the waves. A boatman laid a hand on my arm and pointed to the wreck, which lay close in upon us. One mast was broken short off, and lay over the side, entangled in a maze of rigging. Some efforts were made to cut this away, for as the ship rolled, I descried her crew at work with axes.

The second mast was still standing, with the rag of a sail and broken cordage flapping to and fro. 'The ship had struck once,' the boatman said, 'and then lifted and struck again.' I understood him to say that she was parting amidships; and as he spoke, a great cry of pity arose from the people on the beach. Four men rose with the wreck out of the deep, all clinging to the rigging of the remaining mast. There was a bell on board, and every time the ship rolled this bell rang, and its 'ding-dong' seemed to be the knell of the unfortunate men. Again she was lost to view, and when she rose, two of the men were gone. Another cry arose, and we saw the two remaining wretches swept off. The wreck was now breaking up. She was seen to part in the middle, and a huge mountain of water rose and buried her from our sight for ever.—*Abridged from 'David Copperfield.'*

Euclid.

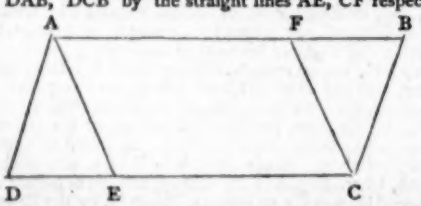
MALES.

[All generally understood abbreviations for *words* may be used.]

(*Answer two Questions, including Question* 1, *if you can.*)

1. Straight lines which bisect two opposite angles of a parallelogram are parallel or coincident.

Let ABCD be the parallelogram. Then if the figure be a square or a rhombus, the bisecting lines will be coincident, because the diagonals of such figures bisect the opposite angles. (Props. 5, 29, Bk. I.) But if ABCD be not a square or a rhombus, bisect DAB, DCB by the straight lines AE, CF respectively.



AE shall be parallel to CF. Since the angle DAB=(Prop. 34, Bk. I.) angle DCB, the angle FAE=angle FCB, being halves of equals, and the alternate angle BFC=the alternate angle FCE; therefore BFC=FAE. That is the exterior angle=to the interior opposite angle, wherefore FC is parallel to AE.

Q. E. D.

2. If a straight line be divided into any two parts, the rectangles contained by the whole and each of the parts are together equal to the square on the whole line.

Prop. 2, Bk. II.

3. In every triangle, the square on the side subtending either of the acute angles is less than the squares on the sides containing that angle, by twice the rectangle contained by either of these sides, and the straight line intercepted between the acute angle and the perpendicular let fall upon it from the opposite angle.

Prop. 13, Bk. II.

Algebra.

MALES.

(*Answer two Questions.*)

1. In a mile race between a bicycle and a tricycle their rates were proportional to 11 and 8. The tricycle had 320 yards start, but was beaten by half a minute. Find the rate of each.

Let $11x$ = No. of yds. run by the bicycle in 1 min.
Then $8x$ = " " " tricycle " "
Hence the bicycle takes $\frac{1760}{11x}$ or $\frac{160}{x}$ min. to run the race,
and " " tricycle " $\frac{1760-320}{8x}$ or $\frac{180}{x}$ min. to run the race.

$$\therefore \frac{160}{x} = \tfrac{1}{2} + \frac{180}{x}$$
$$320 = x + 360$$
$$x = 40$$

$\therefore$ the rate of bicycle = 440 yds. per min. Ans.
and " tricycle = 320 " " " Ans.

2. Reduce $\frac{85(20a^4+a^2-1)}{102(25a^4+5a^3-a-1)}$ to lowest terms, and divide $\frac{16a^2-25b^2}{a^2-b^2}$ by $\frac{4a-5b}{(a+b)^2}$.

$$(a)\quad \frac{85(20a^4+a^2-1)}{102(25a^4+5a^3-1)} = \frac{5(5a^2-1)(4a^2+1)}{6(5a^3-1)(5a^2+a+1)}$$
$$= \frac{5(4a^2+1)}{6(5a^2+a+1)}. \text{ Ans.}$$

$$(b)\quad \frac{16a^2-25b^2}{a^2-b^2} \div \frac{4a-5b}{(a+b)^2} = \frac{(4a+5b)(4a-5b)(a+b)(a-b)}{(a-b)(a+b)(4a-5b}$$
$$= \frac{(4a+5b)(a+b)}{a-b}. \text{ Ans.}$$

3. Solve:—

(1) $-2+\frac{6x}{4+2x} = \frac{c^2x}{c^2+c^2x}$

(2) $\left.\begin{matrix}129x+203y=793\\ 31x+87y=267\end{matrix}\right\}$

(3) $x=348-60x^2$

(1) $-2+\frac{6x}{4+2x} = \frac{c^2x}{c^2+c^2x}$; or $-2+\frac{3x}{2+x} = \frac{x}{1+x}$

$$\frac{-4-2x+3x}{2+x} = \frac{x}{1+x}$$
$$\frac{x-4}{2+x} = \frac{x}{1+x}$$
$$x-4x+x^2-4 = 2x+x^2$$
$$5x = -4$$
$$x = -\tfrac{4}{5}. \text{ Ans.}$$

(2) $129x+203y=793$; or $387x+609y=2379$ multiplying by 3
$31x+87y=267$; or $217x+609y=1869$ " " 7

Subtracting $170x = 1510$,
hence $x = 8\frac{1}{2}$ Ans.
and $y = 2$ Ans.

(3) $x=348-60x^2$

transposing $60x^2+x=348$

dividing by 60 $x^2+\frac{x}{60} = 5\frac{4}{5}\frac{8}{0}$

completing square $x^2+\frac{x}{60}+(\frac{1}{120})^2 = \frac{83520+1}{120^2} = \frac{83521}{120^2}$

taking root $x+\frac{1}{120} = \pm\frac{2}{2}\frac{8}{9}\frac{9}{0}$
$x = \pm\frac{2}{2}\frac{8}{9}\frac{9}{0} - \frac{1}{120}$
$= 2\frac{3}{4}$ or $-2\frac{5}{12}$. Ans.

Mensuration.

MALES.

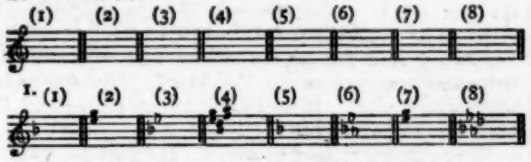
Find the cost of paving a circular court 30 feet in diameter at 2s. 3d. per square foot, leaving in the centre a space in the form of a regular hexagon, each side of which is 2 feet.

	sq. ft.
Area of circle $=30^2 \times .7854$	$=706.86$
,, ,, hexagon $= 2^2 \times .433 \times 6$	$= 10.392$
Area to be paved	$=696.468$ at 2½s. per ft.
$2\frac{1}{2}s. \times 696.468$	$= 1567.053s.$
	$= £78\ 7s.\ 0.636d.$ Ans.

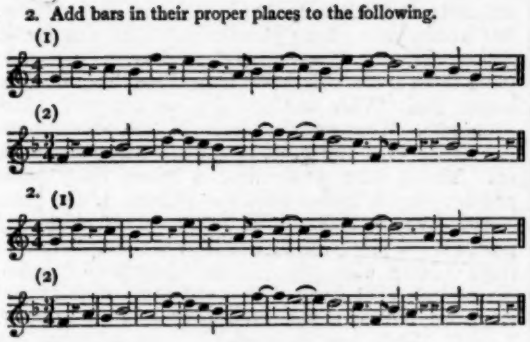
Music.

A quarter of an hour allowed for this paper.

1. Write in the bars which follow, the proper signatures of the keys of (1) F, (2) G, (3) B flat, (4) A, (5) D minor, (6) C minor, (7) E minor, (8) F minor.



2. Add bars in their proper places to the following.



3. Write down the major sixths found between the notes of the scale of E flat.

—o—

The New Class-Subject, 'Elementary Science.'

(What to teach, and how to teach it.)

BY RICHARD BALCHIN.

THERE seems to be a disposition to regard this subject as one intended exclusively for *boys*. It has been stated that my syllabus for Elementary Science would be altogether out of place in a girls' school. Only last week I received a letter asking whether it would not be possible to arrange my subject 'so that it should be suitable for girls.' In answer to this, I have only to say that I regard science-teaching in our schools as, in the main, a means for securing intellectual growth; and that I do not recognise the slightest difference between the manner of mental development of a girl and that of a boy. Whatever plans are best suited to train the faculties of perception, judgment, reason, etc., in the case of a boy, are equally applicable in that of a girl. What is sauce for the gander is sauce for the goose likewise. As to the subject itself being altogether unsuitable for girls, I should like to ask:—'Why?' Are reason and judgment necessary to boys and men only? It seems to me that the kind of mental training which science-teaching gives is even *more* essential in the present day to girls than to boys; and for this reason: the former have been for ages altogether neglected in this respect. There is at least a century of lost time to make up; a load of accumulated arrears to 'wipe off.' Give girls a fair chance of participating in that mental culture which has hitherto been considered the monopoly of boys, and it will soon be seen that they are quite as capable of grasping the same profound thoughts as are deemed the exclusive property of the male mind. But girls have been neglected; and as a result, we see that the huge cloud of superstition and ignorance of the present age settles most persistently over the feminine mind. More of the sunshine of science would long since have cleared away the mist. Teachers know, to their cost, with what a small amount of judgment most mothers train their children. Nearly every day, too, the papers tell how some weak-minded young woman has parted with her money to a fortune-telling imposter. To-day, when I came into my room to write this article, I found the arm-chair carefully placed between the window and the grate 'to prevent the sunshine from putting out the fire!' and the poker was inverted and stood up against the bars, making with the uppermost of them 'the sign of the cross,' to cause the fire to 'draw up'! The young woman responsible for all this hadn't the remotest idea that it was the dust choking up the bottom of the grate that required clearing away.

Certainly, if there is any one place more than another where means for the development of reason and common-sense should be adopted, it is a girls' school.

I will now reproduce the lesson given to the 'first standard' on 'The Stones of the Streets.' It will be remembered that this subject stands next on the detailed syllabus given in the February issue of the PRACTICAL TEACHER.

The main facts to be taught here are:—That in walking along the streets we may see three kinds of stone:—1st, the large flat stones of the pavement, flagstones; these are sandstones. 2nd, the very hard blocks of the kerb; these are granite. 3rd, the white soft stone around the doorways and windows; this is limestone.

The objects exhibited are large specimens of these stones, and a great number of small pieces; also a picture of a stone quarry.

Now, boys, you each have before you on the desks a number of stones; but I don't want you to touch them just now. Look at these large blocks upon the table. I will hold one in my right hand and one in my left; can any boy see a difference between these two? Answers—One is flat at the top, and one is crooked. One is yellow, and the other isn't. One has a number of sparkles. One has some white specks all over it. Very good. See, I am scraping one with this piece of rough iron; what happens? Ans.—Some dust is coming off. Now I will scrape the block with the shining specks or sparkles on it; nothing comes off. Why? Ans.—Because it is so hard. Look at the pieces before you; pick out any that have glistening specks, and put them together, apart from the others. Now see whether you have any like the other block off which I scraped the dust. You have no iron scraper, but you can use the corner of the slate. I will come round and see what you have done. Ah! Jones, you have put a piece with the glistening grains in the wrong group. Tell me what the dust you have been

scraping off looks like. Ans.—Sand. Yes, it *is* sand. Notice. I will break up one of the pieces on this slab: there, you see I have made a powder of it. Come here, Smith; take up some of the powder. What is it? Ans. (Smith)—Sand. Try and scrape the 'sparkles' from the other stone. You can't? Well, look; I will break up to a powder a little piece of it on this slab. You three boys come out here to the table. I want you to pick out from this powder any of the sparkling grains. Very good. You have about twenty of them; they are very small. In the powder, what can you see besides the glistening grains? Ans.—Some white specks. Are they all white? Ans.—No, sir; some are like little bits of dirty glass. Just so; pick out a few of each. That will do, thank you; you can go to your places. Look, boys; out of this hard stone, which I hammered up, these boys have picked out three sorts of grains: one sort is bright and shining, another is rather white, and the other is like dirty glass. Look at the pieces you have on the desks. Very likely you can see these three kinds of specks; they are called 'grains,' and the stone itself is called 'granite.' Has any boy ever seen places built of granite? Answers—Yes, sir; the canal bridge is. (Another boy)—I have seen it in the churchyard: the gravestones are made of it. Have you ever seen it in the streets? No one? Is the pavement anything like it? Ans.—No, sir. Have you ever noticed the kerbstone? Ans.—No, sir. Well now, which of these two stones is the harder? Ans.—The granite. If you were to use these two stones for the pavement, which would you use for the kerb? Ans.—The granite. Why? Ans.—Because it is hard. Why do you want a *hard* stone for the kerb? Ans.—Because it is where the carts might run against: it is on the outside. Just so; and the next time you are out in the street just look at the kerbstone: you will see it is granite. Perhaps you will find that it is not quite the same as this; there are many kinds of granites, but they are all made up of different coloured specks or grains. I will now write on the board what we have found so far. 'Granite is a very hard stone; it is made up of grains, and is used for the kerbstone and other things.'

Now look at this block of stone; I broke up a piece of it just now to a powder, which you said was sand, and you were right. It is sand, and the stone is called sandstone. Can you tell me what makes it so flat on the upper and under sides? Ans.—The workmen *ground* it flat. Have you ever seen workmen doing that? Ans.—No, sir. Well, see what I will do. I hold the block, flat side up, in my left hand, take the hammer, and give three or four hard blows upon the edge; see, the stone breaks up into plates, or flakes—flat pieces, you notice—all about the same thickness. (A boy, raising his hand)—Please, sir, there's a lot of sparkles on that flat top! Ah! so there is. Look, boys; on nearly every slice there is a layer of glistening grains. (Several boys)—I have them on some of my pieces. (Another boy)—They are like the sparkles in the granite. Yes; they *are* the same kind of grains. But can any boy tell me in what respect the shining specks in the sandstone are different from those in the granite? (After a pause) Ans.—They are all 'here and there' in the granite, but they are all 'in a line' in the sandstone. Just so; in the granite they are scattered about, but in the sandstone they are in layers. You said just now you would put the granite for the kerbstone because it is hard. Don't you think it would be well to have this hard stone for the pavement as well as for the kerb? Answers—Yes, sir. No, sir. Why do *you* say 'Yes'? Ans.—Because it would not wear out. Why do *you* say 'No'? Ans.—Because they could not get pieces large enough. Ah! if any of you boys were to look at the granite of London Bridge, you would see blocks as large as you might want for the pavement. (Another boy)—It would be such a trouble to make it flat. Just so; *that* is the reason. Now, which stone do you think would be best for the pavement? Ans.—The sandstone. Why? Because it easily breaks up into flat pieces. Very well. Now I will write another sentence on the board. 'Sandstone is made up of sand. It easily splits into plates, and is used for the pavement.'

Here is another kind of stone. Does it look different from the others? Ans.—Yes, sir; it is whiter. See among your pieces whether you have any like it. Ans.—Yes, sir; I have three or four. Very well; place them apart. Now you have three kinds of stone before you. What was the first we noticed? Ans.—Granite. What was the second? Ans.—Sandstone. Let us see what the other is. I will hammer a piece up. There, how easily it has gone to a white powder; much easier than the granite or the sandstone. Why? Ans.—It is softer. This morning I placed a few pieces of the stone in the fire and burnt them. Here they are; almost falling to powder. Now watch what I will do. I put some of this burnt stone on the slab, and pour over it a little water. Look! What has happened? Ans.—It has all broken up and become hot. How do you know it is hot? Ans.—Because we can see the steam rising. Have you ever seen anything like this before? Ans.—Yes, sir; when they make mortar. Well, how do they make mortar? Ans.—They first pour water on to some lime, and it 'goes on' just like that. What do you mean by 'going on' like that? Ans.—The lime gets hot, and breaks up, and a cloud of steam rises. Then what does it seem this is on which I have poured water? Ans.—Lime. And how did I obtain this lime? Ans.—You burnt some of that stone. Yes; and for that reason it is called 'limestone.' Have you ever seen stone like this in the streets? Ans.—Yes, sir; I saw two men cutting up some with a saw. How do you know it was this sort of stone? Ans.—Because the powder was white like that on the slab. Have you ever seen men sawing granite? Ans.—No, sir; it would be too hard. Have you noticed what is done with the blocks of limestone the men were cutting? Ans.—They are put round the windows. (Another boy)—I saw a man cutting out a block into the shape of a man's face over the street door. Ah! yes; I have seen that too. Would not granite look well cut or carved into pretty figures over the door? Ans.—Granite would be too hard. Very good. I will write on the board a sentence about this stone. 'Limestone, when burnt, becomes lime. It is a soft stone, easily cut, and is used to make doorways and windows look pretty.' (A short recapitulation here follows.) You may now take out your slates, and copy what we have written on the blackboard. (End of lesson.)

In next month's issue I will give the substance of the remaining lessons in the year's syllabus for standard one. *(To be continued.)*

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Publications Reviewed.

Select Readings and Recitations. By Geo. W. Baynham. London: Blackie and Son.

A careful 'overhaul' enables us to say that this rather bulky volume fully fulfils the compiler's intentions, as set forth in the preface, of, in the first place, affording a reading-book whereby a pupil may be taught to read naturally, clearly, and effectively, and secondly, of supplying a large and varied choice of extracts from the best authors, suited for recitation in schools, and for readings at private social gatherings, and on the public platform. The selections have been most judiciously made, and their scope is so wide that the reader who cannot find, in the 380 pages of which the volume consists, something to suit his particular style must be indeed hard to please. Prose, poetry, the drama, readings grave and gay, are all well represented, and not the least useful part of the book are the instructions and hints on pronunciation and reading which commence it.

The World at Home. Standard II. Royal School Series. London: T. Nelson and Sons.

This little book forms one of the best introductions to elementary geography we have met with. The lively conversational style in which it is written cannot fail to be attractive to children, and will materially assist in riveting the facts described in their youthful minds. Like most of the publications emanating from the firm of Messrs. Nelson and Sons, the illustrations and maps introduced in the text are remarkably appropriate, their general excellence forming a most praiseworthy feature in the book. The exercises in spelling, map-drawing, etc., appended to each chapter are also very carefully compiled.

La Bagatelle. London: Crosby Lockwood and Co.

This is a new edition, much improved and embellished with entirely new cuts, of a little work which has long been favourably known to the public. Many and many a child has taken its first lessons in French from the pages of this little book, the enduring popularity of which proves how well fitted it is for giving primary instruction in that language. To those who do not know the system adopted we may say that there are no rules given, but words and short sentences suitable for children's comprehension are introduced from the very outset, and thus a knowledge of the French vocabulary is insensibly acquired, which will afford a good groundwork for deeper studies in grammar and composition in after years.

Handbook of English Composition Exercises. London: Blackie and Son.

This little book is calculated to be of great service to teachers, in their endeavours to instil into their pupils a love for and a knowledge of that most difficult and desirable of accomplishments—the power of expressing their thoughts in decent, well-chosen sentences. It contains a series of short tales, fables, etc., for reproduction, a copious list of subjects for essay-writing on almost every conceivable topic, a selection of proverbs and practical extracts for expansion and explanation, and a few practical hints on letter-writing. The little book will be welcomed by many. It has our cordial commendation.

Health in Schools. London: David Bogue.

This little book forms one of a series of 'Health Primers' written by some of the best physicians in London, and published by Mr. Bogue. It thoroughly maintains the reputation of its predecessors, and although the treatment of the subject in so small a book is necessarily sketchy, it is thoroughly reliable so far as it goes, and lays down the general principles of the subject with exactitude and force.

We are glad to see that Liebreich's researches on the influence of school life on sight and figure have due prominence ascribed to them. There is no doubt that short-sightedness and diminished acuity of vision are very commonly due to insufficient or ill-arranged light in the school-room, or to desks and seats which are not of the right shape and size; while curvatures of the spine are frequently induced by low desks and lack of support to the back.

It is pleasant to see the absurdity of Rule 15 of the

Education Department exposed, which states that 'the windows should be so placed that a full light should fall upon the faces both of the teacher and of the child.' A light from the back is bad, as the head throws a shadow on the book; but a light from the front is much worse, as it is hurtful to the eyes and fails to illuminate the book well. The best light is that obtained from the side and above, and preferably from the left side.

The influence of mental study on the bodily health of boys is discussed, and the opinion maintained that, given plenty of food and exercise, it is very rare to have any evil result from hard mental work. At the same time the throwing open of instruction to children of the poorer classes in Board-schools makes the question a more difficult one to decide. It is certain that in many cases the forcing of poor underfed and badly clad children to do the same amount of mental work as their more favoured fellows is productive of very evil results. The anæmic brains are injured by the strain, and headaches and a tendency to various nervous diseases are no infrequent consequences. The rigid enforcing of a uniform system of examinations may thus become the means of great harm to poor children, unless at the same time means are taken to ensure plenty of good food and healthy hygienic surroundings.

The chapter on 'School Play' forms one of the best in the book, and the whole subject of the use and abuse of exercise is well worked out.

We are sorry to see that the author wishes it to be left to the discretion of boys whether they will drink beer or milk. Doubtless there are cases in which stimulants are required, but boys are certainly not the best judges in this matter: growing boys are much better without stimulants, unless under medical advice.

Sweets are commonly regarded as injurious to children; it is therefore agreeable to see the old idea that sweets decay children's teeth discarded. The frequenting of confectioners' shops, which is one of the weaknesses of youth, would appear to be only the working out of a blind but unerring instinct which tells the young boy or girl that they are necessary, as well as very pleasant to the taste. Wherever growth is going on there sugar is required. The building up of new tissues is always accompanied by an increased assimilation of sugar. It is true none the less that too frequent visits to the confectioner cloy the appetite for meals; hence the proposed forbiddal of all such visits until after dinner.

Some of the more important illnesses to which children at school are subject are discussed in the last chapters and their general bearings stated.

The book is, as we have said, somewhat sketchy, and it would be easy to find fault with it on the score of lack of precise detail. For instance, we see no mention of the proper temperature of a school-room; and the subject of baths and bathing is very lightly touched. The book is rather more suited to the requirements of large public and private schools than of elementary day-schools, and has apparently been written from the standpoint of the former, the author having been medical officer at the Rugby School.

The book is well printed and bound, and remarkably free from printers' errors. The only misprint we notice is 'albuminaria' for 'albuminuria.'

My Governess Life. By Mrs. E. R. Pitman. London: Blackie and Son.

In this well-got-up volume we have an account, written by herself, of a young girl's experience as teacher in a school. She uses her influence wisely and well with her pupils, and though at first looked upon coldly, gains their esteem by her consistent Christian behaviour. The incidents in the tale are varied, and there are many people introduced who are well described, notably so the good old Methodist couple, and the courtly old clergyman who, while differing from them on some points, recognises their zeal and truthfulness, and is not afraid, like some of his cloth, to show his sympathy with them.

Readers who like a pleasant ending to a book will be glad that after a few years of school life, Effie, the heroine, exchanges it for a home of her own, where, with husband and children to love and care for, we leave her, as the fairy-tales always say, to 'live happy ever after.'

Life's Daily Ministry. By Mrs. E. R. Pitman. London: Blackie and Son.

This story reminds us of 'Ministering Children,' but the authoress lacks Miss Charlesworth's freshness and general interest. It is the ministry of duty rather than of love, and although 'Olive,' the heroine, is extremely kind to her sister's orphan children, she does not charm our hearts. The book is prettily got up, and will doubtless be read by many.

Dora: a Girl without a Home. By Mrs. R. H. Read. London: Blackie and Son.

We doubt much the wisdom of placing such a tale as this in the hands of young girls, as it must give them a taste for the sensational literature of the day, seeing that the plots laid by the lawyer to keep his ill-gotten gains are worthy of a popular novel. But older readers who read everything and can discriminate will find the book interesting, and will cordially approve of the lawyer's defeat, and the happy ending of the tale whereby Dora, who is throughout a lovable and truthful character, steadily doing her duty under all circumstances, gets rewarded by finding an uncle, and a home in which to spend the rest of her days in peace and contentment.

Six Useful Plants. London: A. Johnston.

This is a series of six large drawings, illustrative of those six plants which supply so many human wants—the Cotton plant, the Tea plant, the Cocoa plant, the Coffee shrub, the Tobacco plant, and the Sugar cane,—and we have no hesitation in saying that the series only needs to be known to be appreciated. The drawings are effective both from their size—about 28 in. by 22—and from the really artistic way in which each plant has been treated and coloured. When hung up, they will not only break the monotony of the school-room walls, but also prove highly serviceable adjuncts to the class lesson on any of the subjects illustrated. A better and clearer idea of any of the plants can be conveyed to a class by one glance at its representation in this series than by an hour's talk. An important feature which must not be lost sight of is that a full account of each plant, its uses, and history is given on the back of each drawing. The series has our cordial commendation.

Blackie's Geographical Readers. The Comprehensive School Series. Standards III., IV., V. London: Blackie and Son.

These books will take a very high place amongst geographical readers, for not only do they follow the fashion of most other publications emanating from the same firm, in being capitally printed and well brought out, but the matter they contain is very interesting and couched in excellent language. The illustrations, too, are very good, and the maps, considering they are but in black on white, are as clear as any we have come across. Altogether, Messrs. Blackie are to be congratulated on having brought out a series deserving of such high commendation.

Domestic Poisons. By William Thomson, F.R.S. Ed F.C.S., etc. Manchester and London: John Heywood.

This little pamphlet is one of the series of Health Lectures for the People, published by the authority of the Manchester and Salford Sanitary Association—a series which, both from the lowness of the price (one penny) and from the excellence of the subject-matter, cannot be too widely known and disseminated, and the more so since each lecture is the work of a most eminent scientist, and the subjects have been expressly selected as being of

important—in some cases, vital—interest to the people at large. The *brochure* now before us is devoted to Domestic Poisons, and in its twenty pages details are given of the poisonous effects of sewer gases, putrid emanations, coal gas, arsenic, lead, copper, alum, and other things, to the effect of which illness in the household may often be traced when least expected. With respect to arsenic, Professor Thomson says:—'Arsenic, however, is sometimes employed in a shameful manner. Not long ago I examined a wall paper specially intended for nurseries, having prints on it of the various illustrations from Æsop's Fables; these pictures were represented on a thick green ground, which was composed mainly of arsenite of copper, and the colour was so loosely fixed that it could be detached by the slightest touch, and left floating in the air as a fine dust, and it is from such paper, and in this manner, that most of the cases of arsenic poisoning have been produced.' It is well that the attention of all householders should be directed to such matters as these.

Book of Sports and Pastimes. Part XIII. London: Cassell, Petter, Galpin and Co.

This is a fair average number, in which the subject of indoor amusements is still continued, and after Round or Parlour Games have been exhaustively treated, attention is paid to toy games and toy-making. The details respecting the latter will be interesting to all boys who have a little spare time and are at all clever with their hands, for the descriptions given are so plain that any youth of average capabilities will be enabled to make many of the toys mentioned without any very great trouble.

Universal Instructor. Part XXX. London: Ward, Lock and Co.

This number is fully equal to any of the preceding. The fact that the names of Professor Delamotte, Isaac Pitman, Dr. Leary, Dr. Dulcken, and Thomas Dunman occur in the list of authors is a guarantee of the excellence of the subject-matter. We note that shorthand is commenced in this part. The chapter on mathematical instruments will be especially interesting to art students.

English History Dates, upon a New Plan. By W. J. Hassall. London and Manchester: John Heywood.

We can best review this little book by briefly describing the system pursued in it. Its chief feature is that between any two dates is left a clear space proportionate to the number of years that have passed by. This calls the eye into play, and conveys to the mind a clearer idea of the lapse of time than the old method of simply writing down the events and dates in a column without any regard to the time between them. Other details of the plan pursued are: Each page is divided into three columns; that to the left gives the decade, the centre gives the chief events in each decade, and in the third occur the names of the contemporary celebrities.

Course of Arithmetic. By T. B. Ellery, M.C.P. Standard VI. London and Edinburgh: W. and R. Stephens.

This little book is well adapted for its work. Copious well-graduated exercises, clearly expressed rules, and numerous worked-out illustrative examples are the chief features in it. The printing is excellent, the varieties of type introduced adding much to the legibility and clearness. It is to be noted that in treating of Compound Proportion the old method by Dots, and the new Unitary method are given side by side, and the importance of both plans being taught is, as it should be, strongly recommended. The exercises given at the end have been selected from the papers set at various examinations, and will be found very useful in testing the pupil's progress.

A Sliding Synopsis of the Terminations of French Verbs. By Leopold Courtial, Professor o the French Language and Literature at Firth College, Sheffield. London: Hachette and Co.

Every attempt to smooth away the difficulties which beset the path of the learner when struggling through the mysteries of French conjugations, and striving to learn the proper use of the moods and tenses, is to be welcomed, and the fact that Professor Courtial's little manual is in its fourth edition is an undoubted proof that the system therein evolved is a sound one, and has been appreciated to no inconsiderable extent. We can safely say that the student who conscientiously works through the six or seven tables drawn up therein, and carefully applies the rules given for the formation of tenses, etc., will be in a fair way of mastering this confessedly difficult subject. We have pleasure in recommending the little manual to the notice of teachers and students.

Simple Lessons in Landscape Painting. Vere Foster's Water Colour Drawing Series. London: Blackie and Son.

We have pleasure in calling the attention of teachers and students to this series of four books. They are very carefully brought out, and to those who have already mastered the difficulties of sketching in black lead pencil will afford a welcome aid in the pursuit of the higher branches of the art. Each book contains two highly-finished chromo-lithographic drawings, besides numerous illustrations in black and white, and the directions appended to each lesson being written in a thoroughly practical and clear manner, render the series of special value to those who have not the advantage of a master's tuition.

Lessons in English History. By J. R. Yarnold. London and Manchester: John Heywood.

In this little book the history of England is thrown into a series of short paragraphs varying in length from about two lines to ten, and each containing some fact or facts it is important should be remembered, the idea being, we suppose, to render it more easy for the pupil to commit the facts therein mentioned to memory, and for the teacher to frame questions on the same. It is very doubtful, however, if this plan is likely to prove so advantageous to the pupils as the one in more common use, in which the history is treated in a less disjointed way, and the learner is able more clearly to see the sequence of events and the connection between them. Sequence and connection are, as every teacher knows, very valuable aids to memory, and when English history is treated in the paragraphic manner in which Mr. Yarnold has treated it in this book, no matter how skilfully it is done, these aids are to a great extent lost, and history takes the form simply of a series of isolated facts. We have no hesitation, however, in saying that, supplemented by good oral instruction and used in connection with the Genealogical and Chronological Chart compiled by the same author, this little book may be of service.

Principles of Agriculture. Stages I., II., and III., in three volumes. By W. T. Lawrence. London and Edinburgh: W. R. Chambers.

This is an admirable series of small text-books arranged according to the requirements of the new code for specific subjects. The writer is evidently a practical teacher, and he has succeeded in giving a very readable and at the same time reliable series of manuals. The knowledge of the contents of these small volumes, if possessed by every farmer, would lead to much more successful farming operations in this country, and would result in our hearing less of foreign competition.

The first volume treats of the different kinds of soil, and their modes of formation; also the objects of culti-

vation of the soil. The subject is, as far as possible, illustrated by simple experiments, and taught practically. The style of writing is easy to be understood by boys.

The second volume treats of manures and the chemical principles involved in the supply of plant-food. The chemical part of the book is well written, and the chemical changes are clearly explained by a graphic method, without the actual use of formulæ (as in the chapter on phosphatic manures).

In the third volume the principles regulating the growth of crops are treated of. This is really the most practical section of the work, and contains the application and elaboration of the principles advanced in the two earlier stages. It is extremely well done, and we wish that the interesting science of agriculture, embracing as it does the principles of chemistry, physics, and botany, with many practical applications from these, were more popular than it is. These little books are well printed in clear type; important facts being stated in italics or a thicker type. We have only come across one misprint in all the three volumes.

Longman's Magazine for April, 1883. London: Longmans and Co.

This is a really excellent number of this magazine. The interest of Mr. Pain's admirable story is well kept up. Other eminent writers contribute to its pages.

*** *Several reviews are unavoidably held over.*

Science Notes.

THE PHYLLOXERA IN THE FRENCH VINEYARDS.—The importance of the cultivation of the vine in the south of France lends considerable interest to the diseases to which the plant is liable, and the most efficient means of preventing their attacks. Of all pests the phylloxera is the most deadly; of its ravages some idea may be gained from the report of the Director of Agriculture, M. Tisseraud, lately given to the committee appointed by the Minister of Agriculture to investigate the condition of the vineyards. In this it appears that nearly a million and a half acres have been attacked by it, and their yield much affected. Naturally great importance is attached to investigations as to the best means of prevention, and a premium of £12,000 has for some time past been offered by the Government for a remedy. There are two palliatives at present adopted, but they are not perfectly satisfactory. One consists in dressing the vines with a sulpho-carbonate, the other in submerging the vines. The vine-growers also are becoming more active in the matter, and forming associations for the purpose of conducting experiments as to the best mode of dealing with the phylloxera, not fewer than twelve thousand members belonging to them. The associations last year received subsidies from the Government, amounting to upwards of £40,000. It is discouraging to find that, in spite of all these efforts, last year the ravages of the pest spread still further, seventeen fresh districts being invaded. Great fear is entertained lest the Algerian vineyards should also be visited by it.

* * * * *

EXPLORATIONS IN EGYPT.—An interesting geographical discovery has been recently made by M. Naville in the course of his excavations, undertaken for the Egyptian Exploration Fund. At Tel-el-Maschuta, a place about half-way between Ismailia and Tel-el-Kebir, he has unearthed an inscription which proves that spot to be at once the Pithom and the Succoth of the Bible. Pithom appears to have been its sacred name, descriptive of the Temple, and Succoth its civil name. Both names occur in the sacred history in connection with the slavery of the Israelites in Egypt, and their route towards the desert. The discovery is important as leading to a determination of the route followed in the Exodus, besides localizing the treasure-city.

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MARINE ENGINEERING.—A new work, to be completed in twelve monthly parts, has just been commenced by Mr. Maw. It will deal with the latest examples of progress in the way of building and propelling vessels for both warlike and mercantile purposes. Special interest will attach to the sections dealing with high speed launches and torpedo boats, which evidently will play so important a part in naval warfare of the future. As defences for a shore or a harbour, they will rank in efficiency before the older and more imposing iron-clads, and will be almost invaluable as auxiliaries to them at sea. Besides these, the construction and internal economy of the most remarkable of the steel steam-ships of the Allan, Inman, and Cunard lines will be worthy of attention, as showing what are the most modern developments of efficiency, combined with comfort, in our emigrant vessels. The work bears the title of 'Recent Practice in Marine Engineering.'

* * * * *

PURIFICATION OF THE AIR IN ROOMS.—A new invention has been brought out by Dr. Neale, dealing with the ill effects of impure air in confined spaces. He calls his mechanism a 'chemical lung.' In form it is something like a 'punkah,' and is worked in precisely the same way. It is made of two large surfaces of cellular webbing, revolving slowly upon rollers, and constantly undergoing a process of saturation with a solution of caustic soda, contained in a zinc receiver or gutter, through which the material passes. The waving of this backwards and forwards in the air removes the impurities and absorbs the carbonic acid gas. Some interesting experiments recently made to test its power showed that in a few minutes the fumes caused by burning three ounces of sulphur were completely removed from a small room. The temperature, too, was much affected, being reduced by the apparatus seven degrees in ten minutes. Dr. Neale claims for his process that it can be applied with beneficial results to the purification of the air in theatres or in the railway carriages of the underground railway. He suggests that in the latter case a special carriage could be run with a freight of caustic soda or caustic lime, which, after absorbing the noxious products in the tunnels, would be still a marketable commodity. However that may be, there is no doubt that the invention is of considerable value for the purpose of improving the ventilation of the rooms of dwelling-houses.

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ELECTRIC FANS.—A useful and ingenious application of the small electric motors which the recent developments of electricity have made familiar, takes the form of an electric fan for drawing-room use. The fan is mounted on an ornamental pedestal, and is kept in motion by a hidden mechanical arrangement which is worked by the electric motor. This secures a long continuance of the fan's action, without the labour of winding up, which would be needed if the mechanism

took the form of a spring. The battery supplying the power to the motor is concealed in the interior of the pedestal. The instrument is called the zephyrifer. It is adapted to the purposes of disinfection in sick rooms or the wards of our hospitals.

* * * * *

DANGER OF EXPLOSION IN BREWERIES.—It is well known that part of the danger of explosions in coal-mines consists in the presence in them of coal dust in a very finely divided condition. A paper recently published by Mr. Hexamer points out that any finely powdered form of combustible material may be a source of similar danger. The writer calls attention especially to the fine flour dust in corn mills and the grain dust that is met with in breweries, which often reaches such a degree of fineness, that on the slightest provocation it is instantaneously ignited, giving gaseous products of many hundred times the volume of the floating dust.

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MONSTER TELESCOPES.—A new telescope has been placed in the Observatory at Princeton, New Jersey, which has an objective twenty-three inches in diameter. The largest hitherto known are but little in excess of this, the Vienna one being twenty-seven inches. A still larger one is in course of construction for the Paris Observatory, which will have a diameter of thirty-two inches, and will be forty-nine feet in length. The lenses of these telescopes are cut by opticians of different nationalities, but the glasses are all supplied by a Paris firm. Admiral Monchez has decided to use a gas machine for setting in motion the dome which will cover the equatorial of the Paris telescope.

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PHOTOGRAPHY IN PHYSIOLOGY.—Some interesting attempts to photograph the human vocal organs while in the act of singing were described by Mr. Trueman Wood at a recent meeting of the South London Photographic Society. The experiments were performed on the person of Herr Hehnke, and were made for the purpose of procuring illustrations for a new work which he is about to publish, in conjunction with Mr. Lennox Browne, on the mechanism of the human voice. The chief object was to have an accurate representation of the positions of the vocal chords when giving utterance to notes of different pitch. The difficulty was of course to bring sufficient light to bear upon the interior of the throat. This was effected by the use of a very powerful Siemens electric lamp.

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HONOURS TO MEN OF SCIENCE.—Among the names recently announced as those of the recipients of the honour of knighthood are two which stand high in the ranks of science. Professor Abel, C.B., F.R.S., is to receive the distinction in recognition of valuable services rendered by him to the War Department and to other departments in his capacity of chemist to the former. The honour is a fitting climax to a distinguished career. The other name is that of Mr. C. W. Siemens.

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VIVISECTION AND MR. REID'S BILL.—It is a matter of considerable interest to scientific students to see that for the present at least no further restrictions are to be placed on experiments on living animals, made in the interests of medical science. The existing regulations on the subject hedge the practice about most carefully, and exclude the possibility of the reckless and aimless cruelty with which the anti-vivisection party charge those who practise it. The further restrictions the bill proposed would have effectually stopped inquiry and investigation into many problems, which, when solved, will conduce to the alleviation of suffering, and to greater confidence in the treatment of many diseases. It is idle to deny that it is far better to ascertain the effect of poisons and their proper antidotes by experiments on the lower animals than to acquire the knowledge by waiting for their accidental administration to man. Much important work has lately been done on the effects produced by various species of bacteria and on their detection, also on the possibility of protecting an animal or man from the diseases they cause, by a modification of the vaccination whose utility has been so clearly shown in the case of smallpox. In the light of the recent work of M. Pasteur on fever, hydrophobia, etc., the anti-vivisection party might well consider whether in their agitation for protection of a small number of animals they are not working diametrically against the true interests of humanity, and helping rather to allow pain to the many when saving it to the few.

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Recent Inspection Questions.

[*The Editor respectfully solicits contributions—all of which will be regarded as* STRICTLY PRIVATE—*to this column. For obvious reasons, it cannot be stated in which district the questions have been set.*]

Arithmetic.

STANDARD I. (DICTATED).

(1) 45 + 769 + 208 + 54 + 370 = 1446. Ans.
(2) 3 × 5, 6 × 8, 4 × 9, 5 × 7.

(PUT ON BLACKBOARD.)

(3) 6583 − 1926 = 4657. Ans.
(4) 7049 − 862 = 6187. Ans.

STANDARD II. (DICTATED).

(1) 58,769 × 294 = 17,278,086. Ans.
(2) 31,407 ÷ 7 = 4486,—5. Ans. (girls).
(3) 31,407 ÷ 8 = 3925,—7. Ans. (boys).
(4) 50,091 − 34,782 = Fifteen thousand three hundred and nine. Ans.

STANDARD III.

(DICTATED: PROBLEMS TO ALTERNATE CHILDREN.)

(1) 544,605 ÷ 85 = 6407,—10. Ans.
(2) £50,423 17s. 3d. + £8007 11s. 9½d. + £125,630 18s. 8¾d. + £25 14s. 2½d. + £705 9s. 6d. Ans. £184,793 11s. 5½d.
(3) £540,026 14s. 2½d. − £98,403 9s. 7¾d. Ans. £441,623 4s. 6¾d.

(4*a*) In a boys' school there are 86 scholars, in the girls' there are 78, and in the infants' 61. If 1350 pennies be given among the children, how many will each child get? Ans. 6.

(4*b*) A woman went out shopping. She spent 16s. 8½d. at one shop, 14s. 9d. at another, and 11s. 3½d. at another. Then she found she had 6d. left. How much had she at first?

Ans. £2 3s. 3d.

STANDARD IV.

(1—Boys) £276 14s. 3¾d × 464.
Ans. £128,396 1s.

(1—Girls) £276 14s. 3¾d. × 74.
Ans. £20,476 19s. 1½d.

(2) £30,380 4s. 4½d. ÷ 609.
Ans. £49 17s. 8½d.

(3—Girls) Reduce 70,586 sq. in. to sq. yds.
Ans. 54 sq. yd. 4 ft. 26 in.

(3—Boys) Reduce 276,084 sq. ft. to acres, etc.
Ans. 6 ac. 1636 sq. yd.

(4—Girls) A carriage and a pair of horses are worth £138. The carriage is worth 30 guineas. What is the value of each horse? Ans. £53 5s.

(4—Boys) A farmer sold 119 sheep, and then with the money bought 19 oxen at 10 guineas each. He then had 6s. 5d. left. What did he get for each sheep? Ans. £1 13s. 7d.

STANDARD V.

(1) If 9 lb. of coffee cost £1 1s., how much can be bought for £68 12s.? Ans. 5 cwt. 1 qr.

(2) If the cost of 5 cwt. 2 qr. 20 lb. be £3 11s. 10d., what should be paid for 4 cwt. 1 qr. 1 lb.?

Ans. £2 13s. 10½d.

(3—Boys) Bill:—

62 bush. of oats at 4s. 3d. a bush. =	£13	3	6
27 lb. of hops at 1s. 1½d. a lb. =	1	10	4½
17 qrs. of malt at 7s. 4½d. a bush. =	50	3	0
29 bush. of peas at 2s. 0½d. a bush. =	2	19	2½
Ans.	£67	16	1

(3—Girls) Bill:—

3¾ yds. of linen at 2s. 6d a yd. =	£0	9	4½
6½ doz. yds. of ribbon at 2½d. a yd. =	0	16	3
198 buttons at 8d. a doz. =	0	11	0
300 yds. of tape at 4d. for 20 yds. =	0	5	0
Ans.	£2	1	7½

STANDARD VI.

(1) If the rent of 13 ac. 1 r. 14 p. is £187 10s., what is the rent of 20 ac. 1 p.? Ans. £281 5s.

(2) If 40 horses consume 2835 c. ft. of hay in 9 days, in what time would 16 horses eat 1260 c. ft.?

Ans. 10 days.

(3) Add $1\frac{7}{11}$, $2\frac{7}{15}$, $3\frac{5}{22}$, $\frac{9}{14}$. Ans. $7\frac{1}{1}\frac{2}{5}\frac{9}{4}$.

(4) Subtract $\frac{5}{7}$ of $5\frac{3}{8}$ from 20. Ans. $15\frac{3}{8}$.

(5) Divide $6\frac{3}{5}$ by $\frac{1}{4}$ of $5\frac{1}{4}$ of $5\frac{5}{6}$, and turn the answer into a decimal. Ans. 1·584.

(6) 2·48 × ·69 ÷ ·89,125. Ans. 1·92.

Dictation.

STANDARD I.

'The ducks in the river are glad, but the small birds are not.'

STANDARD II.

'The mother, who had taught her children to be kind and gentle, did not turn the poor, hungry, lame dog away. She let it go into the washhouse; and the children gave it some food.'

Another School.

'Away he went to bring it; and in a few minutes he came back with the corn, and stood kindly feeding the horse with his own hand. After staying beside him for some time, he asked where his stable was, that he might go and see him some other day.'

Grammar.—Pick out three nouns and three verbs from the above.

STANDARD III.

The little daisy is one of the flowers that close at night; but it is as beautiful and bright as ever on its slender stem when it awakes in the morning. When it shuts itself up, it forms a little green ball, not unlike a pea, and can hardly be known from the green grass amidst which it lies.

Grammar.—Find three nouns, verbs, adjectives, and adverbs, and all the pronouns.

STANDARD IV.

At first he scarcely appears to move; but the strength of the current increases, the waters become more troubled; he spins about in the eddies, still clinging with the energy of despair to his support. He passes close to an island—so close that the box touches and stops for one moment; but the next it twists slowly round, and is sucked into the current again. The last hope is that a boat may be ready on the shore at his native village.

Grammar.

Parse—
'On the road I met three ragged beggars.'

STANDARD V.

Parse and analyse—
'She took up her basket from the ground.'

STANDARD VI.

Parse and analyse—
'The horse which I bought yesterday is very lame.'

ERRATA.—From the non-correction of the proof last month, owing to a postal delay of *twelve* days, £5,000,000 was inserted for £500,000; 560 yards for 581; £1161$\frac{1}{1}$ for £1161$\frac{1}{11}$; and Standard VI. was headed VII.

Notes of Lesson on the "Celestial Sphere" and "How to find Latitude."

BY JOSEPH H. COWHAM, F.G.S.,

Normal Master, Wesleyan Training College, Westminster.

INFORMATION.

1. **Horizons.**

(*a*) Objects on the earth's surface disappear from view when removed a short distance from the place of observation.

The line supposed to be drawn round an observer at the distance at which objects disappear from view is called the SENSIBLE HORIZON.

(*b*) At night the stars and moon come into view and appear to form a hollow hemisphere. This hemisphere, with the corresponding half hid from view, make the **Celestial Sphere.**

1. One half of the Celestial Sphere is visible to an observer in any part of the earth.
2. The half visible in England is opposite that seen at our antipodes—New Zealand.

The line drawn round the heavens where the stars at night appear to touch the earth is called the RATIONAL HORIZON.

(*c*) **Comparative view of the two Horizons.**

1.—*Sensible Horizon.*	2.—*Rational Horizon.*
(*a*) Formed by the disappearance of objects on the earth's surface.	(*a*) Formed by the disappearance of sun, moon, and stars.
(*b*) The Sensible Horizon extends as the observer ascends a hill or building, *e.g.*, on the plain it is 2½ miles distant, at an elevation of 400 feet it recedes to 20 miles.	(*b*) The amount of the Celestial Sphere at one time in view is the same for every position. From the point directly overhead to the horizon is one quarter the whole distance round the Celestial Sphere—viz., 90°.

METHOD OF TEACHING.

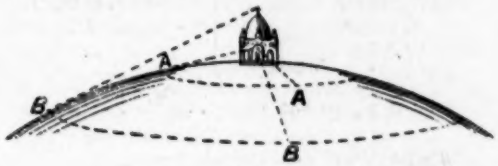


Fig. 1.

(*a*) Refer to ships disappearing as they leave the shore. Show by reference to Fig. 1. that this horizon recedes from an observer as he ascends.

OA = Distance of Sensible Horizon when the observer is at the base of a building.

OB = Distance when observer is on the top.

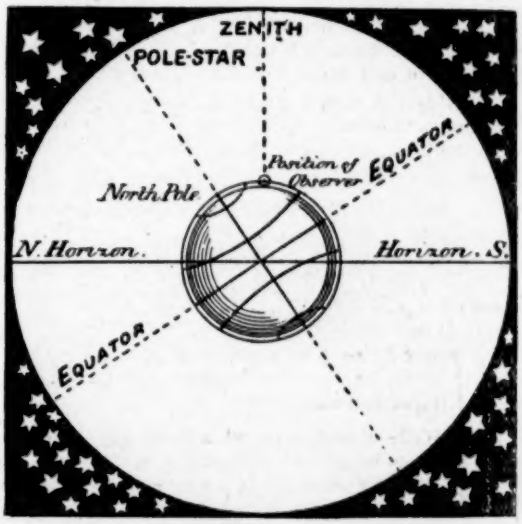


Fig. 2.

(*b*) Teach by reference to the diagram and the appearance of the stars at night. The upper half of the diagram represents that portion of the Celestial Sphere seen in England. The lower half would be seen at night in New Zealand.

Each point in this comparison forms a revision of the two preceding stages. The comparison should be framed mainly by the class, and will serve to bring out thoroughly the essential features of each.

2. Points in the Celestial Sphere.

(*a*) **Zenith.**—The point in the heavens overhead.

(*b*) **Nadir.**—The point in the unseen portion of the Celestial Sphere directly opposite to the Zenith.

(*c*) **North Pole** of the heavens is the point immediately above the North Pole of the earth.

(*d*) **Northern Horizon.**—That portion of the Celestial Sphere which is lowest when we face the North Celestial Pole.

(*e*) **Southern Horizon.**—That portion which is lowest when we turn towards the south.

(*a*) Refer again to Fig. 2, as no well known heavenly body is on our Zenith. Refer to the sun's position at different parts of the day. When nearest the Zenith? When furthest from the Zenith?

(*b*) Put into strong contrast with Zenith. Refer to the New Zealander and his Nadir.

(*c*) Teach by reference to Fig. 2, and by actual observation of Polaris as indicated in Fig. 3.

Fig. 3.

(*d* and *e*) When Polaris is fixed in position these horizons should be observed.

3. To find Latitude by taking the Elevation of the Pole.

1st Stage.—If an observer be at the North Pole on the earth, the pole of the heavens will be on his Zenith. *See Fig.* 4.

2nd Stage.—If an observer be at the Equator, the pole of the heavens will be on his Northern Horizon. *See Fig.* 5.

3rd Stage.—Midway between these extreme positions—viz., at 45° N. Lat.—the pole of the heavens would be at an elevation of 45° above the observer's Northern Horizon.

☞ By the aid of a little Geometry and Fig. 6, the following proposition would be understood.

(1) From Polaris to Equator = 90°.

(2) From Zenith to Northern Horizon = 90°.

(3) From these equals take the common angle between Polaris and Zenith.

(4) The remainders are equal, viz., from Zenith to Equator, and from Polaris to Horizon.

4th Stage.—Similarly, if an observer be 1° N. of the Equator, Polaris will be 1° above the Northern Horizon.

The elevation of the Pole measures the latitude of the observer.

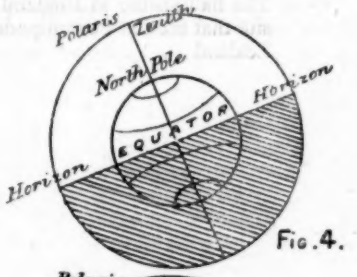


Fig. 4.

Fig. 5.

Fig. 6.

Note.—The shaded portion in the above figures represents the part below the horizon.

Music.

SOUND.—The Science of Acoustics teaches us that all sounds are produced by certain motions of the air, called *vibrations.*

If a tuning-fork be struck and applied to the lip or tongue a peculiar tingling sensation is experienced, which is caused by the rapid 'to-and-fro' motion of the fork. Here we *feel* the vibration; and if the fork be held so as to touch a sheet of paper, we can *see* its effect. But when these vibrations are conveyed through the air to the drum of the ear, and thence transmitted to the brain, a sensation is produced to which we give the name of 'Sound.'

MUSICAL SOUND, OR TONE.—Now all sounds are not *musical:* some are *noises;* others are intermediate between musical sounds and noises, and are called *inflections.* A *musical* sound, which we will call a musical *tone,* is the result of (*a*) regular, and (*b*) continuous vibration; while a noise is caused by broken or irregular vibration. When the vibrations are not continuous (as in ordinary speech), *inflections* are produced.

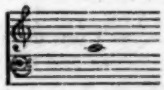
ELEMENTS OF A MUSICAL TONE.—We speak of a musical tone as being (*a*) high or low, (*b*) long or short, (*c*) loud or soft, (*d*) rich, full, hard, thin, etc.; or, in other words, the Elements of a Musical Tone are (1) Pitch, (2) Length (or Duration), (3) Loudness (or Intensity), and (4) Quality.

PITCH.—The pitch of a musical tone depends upon the number of vibrations produced during a given period. When the vibrations are very rapid the tone will be *high* in pitch (shrill, acute, sharp); when they recur slowly the pitch will be *low* (deep, grave, flat).

STANDARD OF PITCH.—Tones can be distinguished by the ear whose vibrations vary from 16 per second (produced by an organ-pipe 32 ft. in length) to from 4,000 to 5,000 per second (shortest strings of harp or piano, highest tones of piccolo). The number of tones lying between these lowest and highest is infinite, and they 'shade off' into each other like the colours of the rainbow. It is therefore necessary, in practical music, to select some definite tone as a *Standard of Pitch.*

The tone selected is named after the letter C, and is called 'middle C,' or 'treble C.' This tone is produced by 256 vibrations per second; it lies in the lower part of women's or boys' voices, and in the higher part of men's voices; it is thus represented:—

Fig. 1 (C Standard of Pitch).

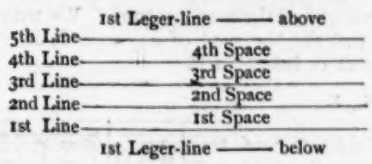
Fig. 1. 

I have given 256 vibrations per second for 'middle C,' but, unfortunately, the Standard of Pitch varies considerably; the Philosophical Standard C has 256 vibrations per second; English Concert Pitch C has 264 vibrations per second; French Normal Pitch C has 261 vibrations per second.

STAFF.—On looking attentively at Fig. 1 you will notice two sets of *five* lines; each of these sets of lines is called a Staff, or Stave, and musical signs (*notes* and *rests*) written on these staves are said to be in 'Staff Notation.'

LINES AND SPACES.—The *lines* and the *spaces* between them are numbered, as in Fig. 2.

Fig. 2.



DEGREES.—Each line and each space of the Staff is called a 'Degree,' and when additional degrees are required above or below the Staff, shorter lines are employed, called 'Leger-lines.' (See Fig. 2.)

CLEFS.—Notice carefully, in Fig. 1, the signs placed at the beginning of each Staff.

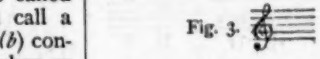
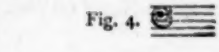
Fig. 3. 

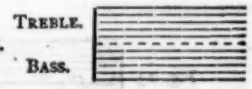
Fig. 4. 

These signs are called 'Clefs.' The *Treble* Clef is shown in Fig. 3, and the significant part of it is placed upon the 'second' line, : notes written on this line have the name 'G,' and the clef is often called 'G' Clef. The *Bass* Clef, shown in Fig. 7, gives the name 'F' to the line upon which it is placed; it occupies the 'fourth' line of the Staff, and is sometimes called the 'F' Clef.

A BRACE or BRACKET joins the Treble and Bass Staves (Fig. 1).

NAMES of Notes and their POSITIONS on the Staff:—'Middle C' (Fig. 1) is placed on a 'leger-line,' which may be regarded as the first leger-line *below* the Treble Staff, or the first *above* the Bass Staff. The two staves, with this leger-line, form one 'great' stave of 11 lines, thus:—

Fig. 5.



The *names* of notes are all reckoned upwards and downwards from 'middle C.'

Fig. 6.

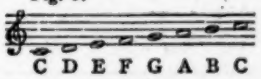
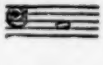


Fig. 7.

OCTAVE, OR REPLICATE.—It will be seen that only *seven* letters of the alphabet are employed, and the *eighth* note has the same name as the first. The second C in Fig. 6 represents a musical tone whose vibrations are *twice* as rapid as those of middle C, and the second C in Fig. 7 a tone whose vibrations are only *half* as rapid.

Thus the vibrations of being 256 per second, those of are 512 per second, and those of  are 128 per second.

This *eighth* note or tone is called the 'Octave' or 'Replicate' of the first, and sounds so much like it that when a note and its octave are heard together the ear recognises them as *one* tone. We may say, therefore, that the 'octave' of any tone is its *repetition* at a higher or lower pitch.

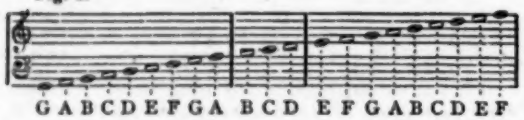
Fig. 8.

The names and positions of notes, as shown in Fig. 8, should now be carefully committed to memory; the following Figs. will assist the learner:—

Fig. 9.

Treble Clef:—Notes on *lines*

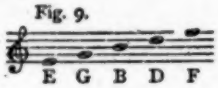
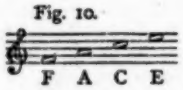


Fig. 10.

" " *spaces*

To be studied thus: first line E, second line G, third line B, etc.; first space F, second space A, etc. Notice that the four spaces of the Treble Clef give the word FACE.

When the notes of the Treble Clef are well known, the Bass Clef may be studied.

Fig. 11.

Bass Clef:—Notes on *lines*

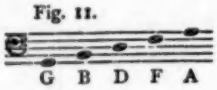
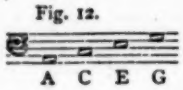


Fig. 12.

" " *spaces*

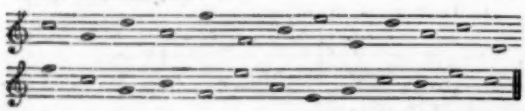


Three notes remain, viz:—

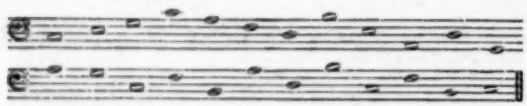
Fig. 13.

In the following exercises the student should first *copy out* the notes, and then write the names underneath.

Ex. 1. Treble Clef.



Ex. 2. Bass Clef.



Ex. 3. Mixed Clefs.

Julius Cæsar.

Act I.

Scene II. A Public Place.

Flourish. Enter Cæsar; Antony, for the course; Calpurnia, Portia, Decius, Cicero, Brutus, Cassius, and Casca; a great crowd following, among them a Soothsayer.

Cæs. Calpurnia!
Casca. Peace, ho! Cæsar speaks.
Cæs. Calpurnia!
Cal. Here, my lord.
Cæs. Stand you directly in Antonius' way,
When he doth run his course. Antonius!
Ant. Cæsar, my lord?
Cæs. Forget not, in your speed, Antonius,
To touch Calpurnia; for our elders say,
The barren, touched in this holy chase,
Shake off their sterile curse.
Ant. I shall remember:
When Cæsar says, 'Do this,' it is perform'd.
Cæs. Set on; and leave no ceremony out.
[*Flourish.*
Sooth. Cæsar!
Cæs. Ha! who calls?
Casca. Bid every noise be still: peace yet again.
Cæs. Who is it in the press that calls on me?
I hear a tongue, shriller than all the music,
Cry, 'Cæsar.' Speak; Cæsar is turned to hear.
Sooth. Beware the ides of March.
Cæs. What man is that?
Bru. A soothsayer bids you beware the ides of March.
Cæs. Set him before me; let me see his face.
Cas. Fellow, come from the throng; look upon Cæsar.
Cæs. What say'st thou to me now? Speak once again.
Sooth. Beware the ides of March.
Cæs. He is a dreamer; let us leave him: pass.
[*Sennet. Exeunt all but* Brutus *and* Cassius.
Cas. Will you go see the order of the course?
Bru. Not I.
Cas. I pray you, do.
Bru. I am not gamesome: I do lack some part
Of that quick spirit that is in Antony.
Let me not hinder, Cassius, your desires;
I'll leave you.
Cas. Brutus, I do observe you now of late:
I have not from your eyes that gentleness
And show of love as I was wont to have:
You bear too stubborn and too strange a hand
Over your friend that loves you.
Bru. Cassius,
Be not deceived: if I have veil'd my look,
I turn the trouble of my countenance
Merely upon myself. Vexed I am
Of late with passions of some difference,
Conceptions only proper to myself,
Which give some soil perhaps to my behaviours;
But let not therefore my good friends be grieved—
Among which number, Cassius, be you one—
Nor construe any further my neglect,
Than that poor Brutus, with himself at war,
Forgets the shows of love to other men.

Cas. Then, Brutus, I have much mistook your passion;
By means whereof this breast of mine hath buried
Thoughts of great value, worthy cogitations.
Tell me, good Brutus, can you see your face?

Bru. No, Cassius; for the eye sees not itself,
But by reflection, by some other things.

Cas. 'Tis just:
And it is very much lamented, Brutus,
That you have no such mirrors as will turn
Your hidden worthiness into your eye,
That you might see your shadow. I have heard
Where many of the best respect in Rome,
Except immortal Cæsar, speaking of Brutus
And groaning underneath this age's yoke,
Have wish'd that noble Brutus had his eyes.

Bru. Into what dangers would you lead me, Cassius,
That you would have me seek into myself
For that which is not in me?

Cas. Therefore, good Brutus, be prepared to hear:
And since you know you cannot see yourself
So well as by reflection, I, your glass,
Will modestly discover to yourself
That of yourself which you yet know not of.
And be not jealous on me, gentle Brutus:
Were I a common laugher, or did use
To stale with ordinary oaths my love
To every new protester; if you know
That I do fawn on men and hug them hard
And after scandal them; or if you know
That I profess myself in banqueting
To all the rout, then hold me dangerous.

[*Flourish and shout.*

NOTES ON SCENE I.—*continued.*

46. *Her.*—The gender of rivers in Latin is masculine. It is doubtful whether Shakespeare's little Latin went as far as this grammatical fact. English rivers are in poetry feminine.

47. *Replication.*—*Re*=again; *plico*=I fold. Re-echo. The only occasion of the use of this word in this sense by Shakespeare.

48. A line four syllables too short. *Find others.*

50. *Cull.*—As of flowers: pick this day for a holiday. Latin *colligere*; French *cueillir.*

52. *Pompey's blood.*—The sons of Pompey.

55. *Intermit.*—Remit is the usual form.

58. *Sort.*—Condition; having the same lot. *Sors*=lot. 'All sorts and conditions of men.'

59. *Tiber banks.*—Some suggest Tiber's bank; but in 'Coriolanus' (I., viii., 8) we have Corioli walls. *Weep.*—As a transitive verb. *Find other cases of the use of verbs usually intransitive as transitive.*

60, 61. An instance of a strained idea—strained so far that bathos is reached. Moreover, there is a glaring error in the use of the word 'lowest.' If the *lowest* stream be level with the top of the bank, Tiber would be slung up in mid-air, like a sort of Mahomet's coffin.

62. *Whether.*—Monosyllabic; often written 'where.' *Metal.*—Mettle. The former is the literal, the latter the metaphorical word. The two spellings were in Shakespeare's time interchangeable.

64. *Capitol.*—Temple and fortress dedicated to Jupiter, upon one of the Tarpeian hills. Built by Tarquinius Priscus, finished by Tarquinius Superbus; besieged by the Gauls 390 B.C.; burnt during the civil war between Marius and Sulla, again during the riots of Vitellius, again in the reign of Vespasian; rebuilt by Domitian.

65. *Disrobe.*—Remove the robe. *Find other words in which this prefix is used in this sense, or with slight modification of it. Images.*—Statues and busts of Cæsar.

66. *Ceremonies.*—The trophies of line 70. A trisyllable.

68. *Lupercal.*—The Lupercalia were held on April 15th every year, at the foot of the Aventine, in honour of Pan. The place where they were held was by tradition that where Romulus and Remus were suckled by the wolf. This tradition has an indirect bearing upon the lines 6-8 of the next scene, in which more details of the festival are given. The date is inaccurate, as Cæsar's death occurred in the month of March.

78. *Trophies.*—The crowns or ornaments dedicated by Cæsar to the gods. *About.*—As a verb. Compare Hamlet's 'About, my brain' (II., ii., 617).

71. *Vulgar.*—Common people. *Vulgus* of the Latin.

74. *Pitch.*—Height, as in the pitch of a note in music. The connection of the term with the radical significance of the verb 'to pitch,' *i.e.*, to strike with a pointed instrument, or to drive something pointed into a thing, is through the idea of marking a point by the insertion of a peg.

76. Compare this idea of the tribunes with that of Cassius in lines 135-138 of the next scene. Notice that whilst to the common folk the success and power of Cæsar are a matter of rejoicing, the men that stand higher in position, in power, and in ambition than they, but lower than he, chafe at his strength and discount his victories.

SCENE II.

Flourish.—Of trumpets.

Course.—*Curro*=I run. Antony had been made by Cæsar chief priest of the newly-instituted order of Luperci that he had named after himself, Juliani. The other two orders of Luperci were the Fabiani and Quinctiliani. *Calpurnia* is the proper spelling, though North, and Shakespeare following him, introduce an *h*. *Decius* should be Decimus.

1. The striking dramatic effect of the beginning of scene i. is repeated here. Shakespeare uses the device often. In this scene, through the murmuring of many voices the voice of Cæsar sounds, and as silence follows upon Casca's shriller cry, the voice is heard alone.

6-10. As the priest ran his course, Roman women held out their hands to receive the touch of the rod he carried, 'persuading themselves that being with child, they should have good delivery; and so being barren that it will make them to conceive.'

10. Perhaps a reminiscence of the centurion passage in Luke vii. 8: 'For I am a man subject to authority, having under me soldiers, and I say to one, Go, and he goeth, and to another, Come, and he cometh, and to my servant, Do this, and he doeth it.'

11. *Ceremony.*—Religious rite. Compare with the use of the word in line 76 of scene i. A tetrasyllable here.

14. Casca will be talking. He is like the people who shout 'Silence' in large assemblies when everybody is still.

15. *Press.*—Crowd (Mark ii. 4).

16. A dramatic iambic line.

17. Observe the regal form of expression. He speaks of himself in the third person. This is an exaggeration of that strange folly, the editorial 'we.'

18. *Ides.*—15th of March, July, October, May; 13th of other months. There is something of sharpness in the tone of the question, I think.

19. By a very Shakespearian touch, the warning as to his death is conveyed to Cæsar by Brutus himself. And this is Brutus' first speech.

21. The bustling busybody is happily hit off in these entirely unnecessary interruptions.

24. *He is a dreamer.*—Here is a fine situation, a collision of many passions. Cassius and Decius, who are already plotting; Casca and Brutus, in doubt of Cæsar's power, both to be shortly won over to the conspiracy; Calpurnia, to whom all omens are very real; Cicero, thinking in Greek, perhaps; Antony, who knows, I think, more of the inner thoughts of all men and women there than any other of the company; Cæsar, with one long, searching, almost anxious look into the dreamy eyes, set in a still face, of the Soothsayer, then, with a gesture, a slight head-movement, 'He is a dreamer.' And yet, as he passes out, the face of the dictator has changed.

Sennet.—The succession of notes with which a trumpeter started a procession.

25. *Go see.*—Omission of the infinitive 'to.' *Find other cases.*

28. *Gamesome.*—Playful. The 'some' is a not infrequent adjective ending. *Find other instances.* Compare this termination with the German 'sam.'

29. *Quick.*—Lively. 'To judge both the quick and the dead.' Antony sees more of life than Brutus, or than any Roman of that time: a many-sided man. *Spirit* is a monosyllable, as Tom Hood has it in the 'Dream of Eugene Aram.' 'So wills the blood-avenging sprite.'

34. *As.*—That. Compare the German 'als.' The image here is derived from horsemanship.

39. *Merely.*—Absolutely, entirely. *Merum vinum* was pure, unwatered wine. 'Things rank and gross in nature possess it

merely,' says Hamlet of the unweeded garden called the world (I., ii., 137). The introspective nature of Brutus comes out here. He eats his own heart, as Bacon has it. *Vexed.*—From *veho*=I carry. Carried hither and thither.

40. *Passions.*—Sufferings. *Of some difference.*—Various in kind.

41. *Conceptions.*—Ideas. *Proper.*—Peculiar to myself, and therefore I have shared them with none, not even with Portia (II. i., 256).

42. *Give some soil.*—Spoil, contaminate. Soil=mould, or dirt. With the same meaning as sully, though the etymologies of the two words are not the same. *Behaviours.*—An intentional use of a rare plural to bring out the idea that several acts of Brutus have occurred calling for some explanation.

47. *Shows of love.*—He uses the phrase of Cassius in line 33. The love is there; only its outward seeming is wanting.

48. *Mistook.*—Strong form of the past participle used by Shakespeare indifferently with its weak equivalent, mistaken. *Passion.*—The emotion you feel, or, perhaps, the external evidences of it.

49. *By means whereof.*—In consequence of my mistake.

53. *But.*—Save, except. *Things* would be much better in the singular. The eye only sees itself by reflection, by aid of some other object, as a mirror. *Practise paraphrasing difficult passages.*

54. *'Tis just.*—It is right; the American 'that's so.'

57. *Worthiness.*—The faintest hint at flattery, just as much as Brutus would bear.

58. *Shadow.*—Image.

59. *Where.*—Cases in which. A word loosely used by Shakespeare. *Respect.*—Esteem. The uneducated classes still send their 'respects' to people, and, as usual, the colloquialism of the vulgar is a fossil of speech.

60. *Casar.*—A dexterous introduction of the name with which he can best conjure when Brutus is concerned. And the form of the introduction is dexterous: he is 'immortal Cæsar.' He is growing too high for man, and aspiring Olympus-ward. Here Cassius is but echoing one of the 'conceptions only proper to myself' of his friend. And the word 'except' is cleverly chosen. Cæsar ranks more highly than all other, and by the using of the phrase 'except immortal Cæsar' just in this place there is the faint suggestion that Cæsar could not have uttered this wish.

62. *His eyes.*—Could see clearly. Compare Hamlet's inquiry to his mother, 'Have you no eyes?' Cannot you see? I *cannot* understand the reason for the lines of discussion on this very simple phrase.

64. I have been this long while introspective, and yet a something not found by myself you'd bid me seek within me.

67, 68. Hoisting the engineer with his own petard. He uses the very idea of Brutus given in lines 52, 53.

69. *Modestly.*—With measure, without exaggeration. Cassius is a far better judge of men and things than Brutus.

71. *Jealous of me.*—Suspicious of. Note the vague use of prepositions, characteristic of the time. *Find other instances.*

72. *Laugher.*—Very interesting in connection with this line is line 205 of this same scene. Cassius rarely smiles, and if he does, it is 'from the lips outward.' I am much inclined to think that Cassius has it in mind to recall to Brutus that he seldom smiles, rather than to disclaim any idea of jesting now.

73. *Stale.*—Make common. See 'Coriolanus' (I., i., 92).

74. *Protester.*—Of affection: 'I protest I love thee.' To protest is to call to witness.

76. *After.*—For afterwards. *Scandal.*—From σκανδαλον (*skandalon*)=stumbling-block: very rare as a verb.

77. *Profess.*—Profiteor=I declare. Friend may be understood.

78. *Rout*=crowd.—Rout-seats.

(To be continued.)

Charles James Dawson, Esq., B.A.,

THE NEW PRESIDENT OF THE NATIONAL UNION OF ELEMENTARY TEACHERS.

WE have very great pleasure in presenting to our readers a portrait of Charles James Dawson, Esq., B.A., the new President of the National Union of Elementary Teachers. Mr. Dawson was born at Cheltenham on the 10th of December, 1839, but his parents removing to Banbury when he was only six years old, he received his early education at the British School in that town, and afterwards became a pupil-teacher under Mr. J. H. Beale in the same school. In 1857 he gained a First Class Queen's Scholarship, and during the years 1858 and 1859 he was a student in the Borough Road Training College, securing a place in the First Class each year. Out of a Second-Year class of twelve students, four others besides Mr. Dawson graduated at the London University—viz., Dr. Wormell, F. H. Corder, B.A., Thomas Dunkerley, B.A., and E. Knott, B.A. This speaks well for the training given at the Borough Road College. After leaving college, Mr. Dawson was for two years an assistant master in the British School at Tean, Staffordshire. In 1862 he was appointed first master of Burradon Colliery School, near Newcastle-on-Tyne. This school was about the first established by the miners themselves on the co-operative principle, being supported by forced contributions from all who worked in the colliery. A year after taking charge of this school he was married to a lady who, besides being a successful schoolmistress, possessed just those qualifications of a literary taste and a lively interest in public affairs which made her a congenial companion and a true helpmeet to a man of such a character as her husband. While at Burradon, Mr. Dawson resolved to continue those studies which he had commenced at college, and to get a degree, if possible. He had to walk six miles in order to partake of the advantages afforded by a town like Newcastle-on-Tyne. He used to go almost every Saturday and examine the book-stalls to see what good second-hand book he could buy for a little money. By perseverance and steady application, he soon prepared himself for the Matriculation Examination in the London University, which he passed in 1866, and in 1868 he took his degree of B.A.

Many young students coming out of training colleges are obliged to go to country schools, and we would recommend them to take a lesson from Mr. Dawson's life in the country. If they have not the advantages of free libraries and philosophical institutions, they have not the same distractions nor the same temptations, and they may, if they choose, prepare themselves for higher positions.

Mr. Dawson, while living at Burradon, was not content with merely preparing himself for the examination for a degree; he took a great interest in all questions relating to education. The subject of national education was at that time exercising the minds of the public, and Mr. Dawson, as a practical teacher, boldly entered into the controversy through the columns of the *Northern Daily Express.* The views he advocated are those that have been to a large extent adopted, as may be seen from the following extract from one of these letters, written more than fifteen years ago:—

'In the present letter I will endeavour to sketch the features of a scheme which, without pretending to completeness, may help to show the practicability of a compulsory measure, and may incidentally serve as a basis of reply to various anticipated objections.

'First, let the present education department, with a Cabinet Minister of Public Instruction at its head, be maintained, with such modification as other parts of the scheme may require, and let its chief functions be, as now, the distribution of national grants in aid of elementary education, and the examination of schools and trained teachers by official inspectors. The State

aid being coupled with the right of inspection would give a national character to the scheme, and act as a check on local mismanagement.

'To secure the advantages which district rating and superintendence would undoubtedly afford, let the Government action be thus supplemented.

and simple mode of sharing the burden of aid between the national and county boards. I would suggest that the former should support the training-school for teachers, and pay the grants on results ascertained by the inspector, while the latter should assist in the building, repairing, and enlarging of school buildings, and by paying capitation grants on the average num-

CHARLES JAMES DAWSON, ESQ.

'In every county let a Board of Education be formed, to levy such rates as might be needed to maintain in efficiency and adequate number the elementary schools of the division. This work could be better done by county boards than by Government, as the members would be men of influence, thoroughly acquainted with the wants of the locality.

'Our experience of the Poor-law, the effective working of which is impeded by the unequal pressure of the rates, and the notorious parsimony exhibited in their administration, should lead us to avoid a system of parochial rating.

'A Government Inspector, with the requisite staff of assistants, should be appointed in each county to visit and examine its various schools for the working-classes; and as a convenient

ber of scholars. A portion of the rate should also be devoted to the maintenance of industrial and ragged-schools for the indigent.'

It will also be seen from another of these letters, written at the same time, that Mr. Dawson has always been a strong advocate for compulsion. He says:—

'The suggestions advanced in my last letter involve the application of more or less compulsion in four different directions—the ratepayers must pay the necessary school-rate, managers of common schools must throw them open to inspection, employers must ascertain that their youthful labourers are educated to a

certain standard, and children must be sent regularly to school. In the first place, the school-rate is opposed on the ground that it would discourage voluntary effort; but surely if supporters of education pay their share of the rate ungrudgingly, they will be as truly voluntary subscribers as if there were no rate.

'The tax would be considered an exaction by those only who were anxious to shirk the performance of a social duty; and no one need be led to make it the limit of his liberality.

'The objection, in fact, is a very trivial one. The second which deprecates the enforced inspection of schools is as easily disposed of; for if, in order to guard the rights of citizens, we provide for the inspection of mines and factories, and of tradesmen's weights and measures, there can be no reasonable plea for exempting schools from similar supervision.

'The objection is especially puerile in a case where the inspection is coupled with a substantial advantage.

'The third form of compulsion may be defended on like grounds; for though it would undoubtedly cause some trouble and inconvenience to employers, it would only be the general extension of a rule which already applies to a large class of manufacturers.

'Under the next head we come upon the first great difficulty: the anticipated resistance of the parents to a plan which will to some extent curtail their slender resources.

'I think that more is made of this by the opponents of compulsory education than experience warrants. Indeed, when the example of Prussia and other foreign countries is brought forward, it is amusing to observe how the objectors try to side away from the point. While some declare that in Prussia there is actually no compulsion, as the people educate their children without being forced, others characterise the Prussians as slaves to a despotic system of centralisation, who have to be watched and kept regular by a force of police and Government officials outnumbering the teachers.

'Many say they are sick of the talk about Prussian education; and a few go so far as to assert, with the Morpeth farmers, that in no foreign state is there a better system than that which prevails in their own district.

'The last two opinions may be passed over as worthless; the first two stultify each other. If, indeed, it is true that no compulsion is needed in Prussia, the reason is that the present generation has profited by the enforcement of the law, and renders glad obedience to it.

'But if a large body of police and inspectors are requisite to enforce attendance, better that they should be so employed, than that all their vigilance should be needed to detect and punish criminals. If by increased expenditure on an army of educators and educational police, England should be enabled to maintain her place in the front rank of nations, to open for her people more avenues to rational enjoyment and intelligence, to make her operatives healthier and happier, her peasantry more active, free, and enlightened, and even her street Arabs useful and virtuous, no section of the nation would have ultimate cause to regret the outlay.'

This correspondence was read by Lord Aberdare, then the Right Honourable H. A. Bruce, M.P., and Mr. Dawson received a letter from him in which he said:—

'Your letters show great knowledge of the subject and appreciation of the difficulties to be overcome. I cannot say that I agree with all your proposed changes; but I am very sure that temperate discussion by thoughtful and experienced men is absolutely required to prepare the public mind for the great changes necessary to the establishment of a national system of education.'

In 1869, Mr. Dawson removed to Alderley Edge Day School, where he remained for more than six years. While here, he became connected with the Manchester and District British Teachers' Association, of which he was the last president. He took a most active part in the formation of a general association of all teachers in Manchester and the District, and after its affiliation with the N.U.E.T., he attended the Birmingham Conference, in 1871. In 1875, Mr. Dawson was appointed Head-master of St. Margaret's Schools, Whalley Range, Manchester, which position he still holds. Since coming to live in Manchester, he has kept up that great interest in all matters relating to education, which is one of the most striking features of his life. He has been the Secretary of the Manchester Teachers' Association, during a period when some of the most important work connected with this association had to be done, including the libel case, Hannay *v.* Birch. While he was secretary, in 1879, the Social Science Congress was held in Manchester, and he was invited by the Council to read a paper on 'The Curriculum and Inspection of Elementary Schools.' This paper was well-received; and was considered so exhaustive, that it was selected as the one upon which the discussion should be based. This was during the late administration, and therefore before the New Code was thought of; but we cannot refrain from noticing that it contains many suggestions which have been embodied in the Code of Mr. Mundella, particularly the plan of making the quality of the instructions, and other features of the school work, a means of correcting the estimate formed merely on percentages of passes. The following quotation from the paper is given in support of this statement:—

'But I would suggest that the quality of the passes should be taken into account, as well as the proportion in the higher standards; and further, that an estimate should be formed of all the important elements of a school's character—the staff (for the employment of efficient teaching-power should be encouraged as a sure means of improving the results), the tone, the discipline, the order, the routine arrangements, the nature and extent of special instruction in additional subjects such as music, drill, science, and literature.

'According to the average or total marks under all these heads, percentage of passes being only one, schools might be divided into degrees of merit, and the grant allotted by allowing so many shillings per head on the average attendance, the amount of the capitation to vary with the merit of the school.

'This plan would demand the exercise of confidence in the inspectors on the part both of the Government and of the school managers and teachers; but, as it would give a higher character to our educational arrangements, it might be fairly expected to bring about this feeling of confidence; and it would be an undeniable advantage in education, as in commerce, if mutual confidence could be established in place of the distrust which so often mars good work.'

In this paper, read before the Social Science Congress, in Manchester, Mr. Dawson most strongly advocated the opening of the Inspectorate to teachers of experience and culture, as may be seen from the following selection:—

'It appears desirable that instead of empowering an inspector to select a young teacher as a sort of official servant, the department should secure the services of teachers of some years' successful experience, and having the necessary qualifications of scholarship, as sub-inspectors, who, after serving another period in this capacity, should be eligible for appointment to chief inspectorships.

'This would be very different from the course now pursued by the department, for I am told that, although it is not impossible that political influence may obtain the post of inspector for a schoolmaster with high university distinction, the inspector's assistant, on his appointment, becomes, *ipso facto*, ineligible for the position for which his duties would seem to be the best possible training.

If, however, such a plan as I have described is out of the question, it would be possible to remove the cause of complaint by requiring every inspector to go through a course of probation, before entering on the responsible duties of his office.

'We have been told lately by Lord George Hamilton that such a plan is adopted, and that new inspectors act "for a few weeks" under the direction of a senior inspector.

'This seems to me altogether inadequate to meet the case.

'If the first year of holding the position of inspector were spent in acquiring a wide experience, by visiting elementary schools of various kinds, in town and country districts, under two or three different inspectors, the desired object might be attained, and the new examiner well equipped for his work.'

Mr. Dawson has also been the President of the Manchester Teachers' Association and the Manchester District Union, and has given inaugural addresses which so impressed the teachers, that the meeting, on each occasion, unanimously invited Mr. Dawson to allow his address to be printed and circulated. The address given as President of the Manchester District Union, in 1880, on the Re-casting of the Code, was sent to every Member of Parliament. It contained a criticism of the proposals placed before the country by Mr. Mundella, and also many suggestions for their modification. Some of these were adopted—*e.g.*, in half-time schools, two attendances should be reckoned as three; that means should be taken to secure uniformity in the examinations; and that, to gain this end, conferences of inspectors should be held regularly. Mr. Dawson said:—

'We live in days of conferences; and by conferences I believe much good is done in the way of reconciling differences, and arriving at other desirable ends. Sometimes, doubtless, the inspectors meet and confer. Let them, then, meet in a conference on the mode of estimating results in a school; let the younger one come disposed to listen to the more experienced; let the latter be willing to exchange their ideas and compare their experiences; let all lay aside their crotchets, and, forgetting the latest steps by which they mounted to the Classical, the Mathematical, or the Science Tripos, fall back on their earlier beginnings on the road to learning's fair temple; let them remember that the tests they have to apply are not for an honours' examination, but for a mere pass for young children whose circumstances are, in nearly all cases, adverse to rapid progress in knowledge. From such a conference something more like equality than we have at present might result.

'No inspector could think the obligation to judge by the same standard as others derogatory to his abilities. If he does, he ought not to be an inspector—he has not the large-mindedness that true culture should develope.'

In the address delivered to the Manchester teachers, Mr. Dawson took for his subject the Relations of the Teacher, and in treating it he advocated the importance of union, a subject he has so much at heart, as will be seen from the following extract:—

'Time forbids my dwelling on these details; but I think I have said enough to make good my case that every teacher ought to become a member of our Union.

'How can any one press home the moral lesson that "Unity is strength," or appeal to the feelings of *esprit de corps*, or avail himself of the sympathy of numbers, or teach that we are all members of one another—all of which things a true teacher can scarcely avoid doing, and yet with any consistency hold himself aloof from his fellow-teachers who are striving for the common good?

'Shall I be wrong in saying that those who refuse to join us are acting a selfish part? But if I say so, I must add that, to my thinking, they act badly; for they seem to be selfishly blind to the advantages they would themselves derive from uniting with others. The motive of self-help and the duty of brother-help should alike influence teachers to associated action.

'I know that you, who by your presence here testify to your belief in the principle and practice of union, may think my words are weak and wasted. But they may, through you, reach those with whom you come in contact, and so become effective. And as the rain trickling through the rock derives colour and potency from the salts which it dissolves, so my words and arguments, weak in themselves, may, as they filter through your minds, receive strength and tone to influence outsiders, and build up our Union into an agency of increased power for good.

'For myself, I can only say that were I endowed with the lusty lungs of a Stentor, and the golden voice of a Chrysostom, I know of no other task to which I would more readily, gladly, and earnestly devote such gifts, than to that of helping the class of teachers to grow into the strong, united, noble, and beneficent profession which I believe it is both worthy and destined to become.'

Mr. Dawson has always taken a deep interest in all organisations for promoting the interests of teachers, and was the first President of the Manchester Tonic Sol-Fa Council.

Publications Received.

Allen and Co.—
Anderson's Catechism of Shorthand.

Blackie and Son—
A Synopsis of English History. By Herbert Wills.

Cameron & Ferguson—
The Cambridge Arithmetical Tables.
The Cambridge Series of Drawing-Books. Nos. 1 to 12.

Cassell & Co.—
Book of Sports and Pastimes. Part XIII.
Cassell's History of England, for Standards V., VI., and VII.

Chambers, W. and R.—
Ellery's Course of Arithmetic. Standards VI. and VII.
Shakspeare's King Richard III., with Notes, etc.

Courtial (Leopold)—
A Sliding Synopsis of French Verbs.

Crosby Lockwood and Co.—
A Symbolic French and English Vocabulary. Illustrated.

Gall and Inglis—
History of England. Part II., Standard V.
The British School Copy-Books. Nos. 2, 5, 9, and 12.

Greenwell (T.)—
Senior's 'My First Algebra.' Second and Third, with answers.

Griffith and Farran—
Our Little Ones. April.
Standard Author Readers. Primers. Parts I., II., IIA, Infants. Standards V. and VI.

Heywood (John)—
English History. Dates from B.C. 450—A.D. 1882. By W. J. Hassall.
The New Graded Arithmetic. Complete.
Domestic Poisons. No. 4 of Health Lectures for the People. A Pamphlet.
The Marvel Writing Copy-Books. Nos. 1, 2, 3, and 4.
Gardiner's Home Lesson Books. Book 5 for Standard V.

Johnston (A.)—
Johnston's Mental Arithmetic Cards. Standards I., II., and III.

Laurie (T.)—
Latin Grammar. Part I. First Accidence. By A. H. Scott-White, B.A.

Longmans and Co.—
Technical Instruction. An Address.
Senior Standard History Readers. Books 1, 2, and 3.
Gardiner's Illustrated English History Readers. Parts I., II., and III.
Buckton's Cookery Scheme of the Leeds School Board for the New Code, 1882.

Marcus Ward and Co.—
The Map and the Compass. A Reading Book of Geography for Standard I.
History Readers. Middle England.

Moffatt and Paige—
Moffatt's Natural History Pictures.
Moffatt's Vegetable Kingdom Pictures.

Murby (T.)—
Historical Reader. Book 1.
The Imperial Drawing Books. No. 3.

Nelson and Sons—
Principles of Agriculture. First Stage.
Junior Algebra. By James Mackean, F.E.I.S.
Royal Map Books. No. 1. England.
Royal Arithmetics. Standards I., II., III., and IV.
The World at Home. Home Lesson Book. Standards I., and II.
Home Lesson Book to Simple History of England.

Reefe Brothers—
Public Examination Grammar. By Arthur Riches, F.R.S.S., etc.

Stanford (Ed.)—
Physics in Pictures.

Ward, Lock and Co.—
Universal Instructor. Part XXX.

Query Column.

RULES.

1. Each correspondent is restricted to *one question*. We should be much obliged if correspondents, who send questions for solution, would give (if possible) the required answer, and the source from which the question is obtained.

2. No query can be answered unless accompanied by the real name and address of the sender, not necessarily for publication, but as a guarantee of good faith and for facility of reference.

3. ☞ When a pseudonym is adopted it should be written at the end of the query, and the real name and address on a separate piece of paper.

4. Correspondents are requested to write their queries *legibly*, and on one side of the paper only.

5. Replies will not be sent through the post.

6. Queries must reach the office *not later than the 12th of the month*, or they cannot be attended to in the following issue.

*** All communications for this column should be addressed—'*The Query Editor*,' *The Practical Teacher*, *Pilgrim Street, Ludgate Hill, London, E.C.*

Arithmetic.

1. A. M.—The sum of four fractions is $2\frac{1}{2}\frac{3}{0}$, and one common result is obtained by adding the fraction $\frac{3}{7\,0}$ to the first, subtracting $\frac{1}{3}$ from the second, multiplying the third by $\frac{7}{8}$, and dividing the fourth by $1\frac{1}{1}\frac{0}{0}$; find the four fractions.

Second fraction $-\frac{1}{3}$ = First fraction $+\frac{3}{7\,0}$,

$\therefore$ Second fraction = First fraction $+\frac{3}{7\,0}+\frac{1}{3}$

= First fraction $+\frac{4}{1\,0}$;

Third fraction $\times\frac{7}{8}$ = First fraction $+\frac{3}{7\,0}$,

$\therefore$ Third fraction = (First fraction $+\frac{3}{7\,0}$) $\div\frac{7}{8}$

$$= \tfrac{8}{7}\text{ First fraction} + \left(\frac{3}{\cancel{7}\,\cancel{0}}\times\frac{\overset{4}{\cancel{8}}}{7}\right)$$

$$= \tfrac{8}{7}\text{ First fraction} + \tfrac{4}{5};$$

Fourth fraction $\div 1\frac{1}{1}\frac{0}{0}$ = First fraction $+\frac{3}{7\,0}$,

$\therefore$ Fourth fraction = (First fraction $+\frac{3}{7\,0}$) $\times\frac{1\,0}{1\,1}$

$$= \tfrac{1\,0}{1\,1}\text{ First fraction} + \left(\frac{3}{\cancel{7}\,\cancel{0}}\times\frac{\cancel{1}\,\cancel{0}}{11}\right)$$

$$= \tfrac{1\,0}{1\,1}\text{ First fraction} + \tfrac{3}{7\,7};$$

First fraction + Second fraction + Third fraction + Fourth fraction $= 2\frac{1}{2}\frac{3}{0}$,

$\therefore$ First fraction + (First fraction $+\frac{1}{3}\frac{3}{0}$) + ($\frac{8}{7}$ First fraction $+\frac{1}{3}\frac{3}{0}$) + ($\frac{1\,0}{1\,1}$ First fraction $+\frac{3}{7\,7}$) $= 2\frac{1}{2}\frac{3}{0}$,

$(1+1+\frac{8}{7}+\frac{1\,0}{1\,1})$ First fraction $+\frac{1}{3\,0}+\frac{1}{3\,0}+\frac{3}{7\,7}=2\frac{1}{2}\frac{3}{0}$,

$\left(\frac{154+88+70}{77}\right)$ First fraction $= 2\frac{1}{2}\frac{3}{0}-(\frac{1}{3\,0}+\frac{1}{3\,0}+\frac{3}{7\,7})$,

$\frac{3\,1\,2}{7\,7}$ First fraction $= 2-(\frac{1}{1\,5}+\frac{3}{7\,7})$

$$= 2-\frac{132+105}{385}$$

$$= \frac{770-237}{385}$$

$$= \tfrac{5\,3\,3}{3\,8\,5},$$

$$= \frac{41}{77}$$

$\therefore$ First fraction $= \frac{\cancel{5}\,\cancel{3}\,\cancel{3}}{\cancel{3}\,\cancel{8}\,\cancel{5}}\times\frac{77}{\cancel{3}\,\cancel{1}\,\cancel{2}}$

$$= \tfrac{5}{2\,4}\tfrac{1}{0};$$

Second fraction = First fraction $+\frac{1}{3\,0}$

$$= \tfrac{2\,4\,1}{1\,2\,0}+\tfrac{4}{1\,2\,0}$$

$$= \frac{41+76}{120}$$

$$= \tfrac{1\,1\,7}{1\,2\,0}$$

$$= \tfrac{9\,7}{1\,0\,0};$$

Third fraction = (First fraction $+\frac{3}{7\,0}$) $\div\frac{7}{8}$

$$= (\tfrac{41}{120}+\tfrac{3}{70})\times\tfrac{8}{7}$$

$$= \frac{41+36}{120}\times\frac{8}{7}$$

$$= \frac{77}{\cancel{1}\,\cancel{2}\,\cancel{0}}\times\frac{\cancel{8}}{7}$$

$$= \tfrac{11}{15};$$

Fourth fraction = (First fraction $+\frac{3}{7\,0}$) $\times\frac{1\,0}{1\,1}$

$$= \frac{77}{12\cancel{0}}\times\frac{\cancel{1}\,\cancel{0}}{\cancel{1}\,\cancel{1}}$$

$$= \tfrac{7}{12}.$$

2. SOLICITOR.—An artesian well supplies a brewery. The consumption of water goes on each week-day from 3 a.m. to 6 p.m at double the rate at which the water flows into the well. If the well contained 2250 gallons when the consumption began on Monday morning, and it was just emptied when the consumption ceased in the evening of the next Thursday but one, what is the rate of the influx of water into the well in gallons per hour? (*Hamblin Smith.*)

No. of hours from 3 a.m. to 6 p.m. = 15,

" " of consumption = 15 × 10 = 150;

" " " influx = (24 × 10) + 15 = 255;

Double rate of influx per hour in gals. × 150

= (Rate of influx per hour in gals. × 255) + 2250 gals.,

Rate of influx per hour in gals. × 300

= (Rate of influx per hour in gals. × 255) + 2250 gals.,

Rate of influx per hour in gals. × (300 − 255) = 2250 gals.,

Rate of influx per hour in gals. × 45 = 2250 gals.,

$\therefore$ Rate of influx per hour = 2250 gals. ÷ 45 = 50 gals. Ans.

3. DON CÆSAR.—The interval between the firing of two guns at a railway-station was 6 minutes, and a passenger in a train, approaching the station at a uniform rate, heard the second report 5 min. 51 sec. after hearing the first. Now, suppose the sound of the train's approach to have become audible at the station when the train was 2 miles off, how soon after that did the train pass the station, sound travelling 1125 feet per second? (*Colenso.*)

In 5 min. 51 sec. the train travels (1125 × 9) ft. = 10,125 ft.;

ft.		miles.		min. sec.	
$\cancel{1}\,\cancel{0}\,\cancel{1}\,\cancel{2}\,\cancel{5}$	:	2	::	5 ,, 51	: Time to pass the station.
$\cancel{6}\,\cancel{7}\,\cancel{8}$		5280		60	
25		$\cancel{1}\,\cancel{0}\,\cancel{5}\,\cancel{6}\,\cancel{0}$		$\cancel{3}\,\cancel{5}\,\cancel{1}$	
		704		13	
		13			

25 | 9152

366·08 sec.

= 6 min. 6·08 sec. Ans.

4. S. P.—A person has £5,000 three per cent. stock, which he sells and invests in $3\frac{1}{2}$ per cents. at $87\frac{1}{2}$. If the increase in his income be £5, what is the price of the 3 per cent. stock?

Income in 1st case = £(50 × 3) = £150;

£ £ " " 2nd " = £150 + £5

£ £ = £155;

$\therefore 3\frac{1}{2} : 155 :: 87\frac{1}{2}$: Amount invested in 2nd stock.

2 2

7 $\cancel{1}\,\cancel{7}\,\cancel{5}$

25

= £3875.

$\therefore$ Price of 3 per cent. stock = £$\frac{3\,8\,7\,5^{\,3}}{5^{\,1}\,0^{\,2}}$

= £$77\frac{3}{4}$. Ans.

5. ANXIOUS.—A person sold 72 yards of cloth for £8 14s., his profit being the cost of 11·52 yards; how much did he gain per cent.? (*Barnard Smith.*)

Cost price per yard = £8 14s. ÷ (72 + 11·52)
= 174s. ÷ 83·52
= 1s. ÷ ·48
= $\frac{25}{12}$s.
= 2s. 1d.;

Selling ,, ,, ,, = £8 14s. ÷ 72.
= $\frac{17}{144}$s.
= $\frac{85}{720}$s.
= 2s. 5d.;

Gain ,, ,, = 2s. 5d. − 2s. 1d.
= 4d.;

s. d. £ d.
∴ 2 1 : 1/240 :: 4 : Gain per cent.
12 4

1/5

= 16 per cent. Ans.

6. E. M.—If 3 per cent. more be gained by selling a horse for £83 5s. than by selling him for £81, what must his original cost have been?

Difference between the two prices = £83 5s. − £81
= £2 5s.;

£ £ s. £
∴ 3 : 2 5 :: 1/80 : Cost price.
4 4 25

1/1 9
4 3

= £75. Ans.

7. A. H.—How many pounds of tobacco at 5s. 3d. per lb. must a tobacconist mix with 4 pounds at 6s. 6d., so that he may sell the mixture at 7s. 10d. per pound, and gain 33⅓ per cent. on his outlay?

£ s. d. £
133⅓ : 7 10 :: 1/60 : Cost price of mixture.
3 3

4/60 | 23 6

5 10½

Difference between cost prices of mixture and first kind
= 5s. 10½d. − 5s. 3d.
= 7½d.;

Difference between cost prices of mixture and second kind
= 6s. 6d. − 5s. 10½d.
= 7½d.

∴ The quantities must be equal, that is, 4 lbs. at 5s. 3d. must be mixed with 4 lbs. at 6s. 6d.

8. HAIRBRAIN.—Reduce $\sqrt{\cdot 001369}$ to the decimal of $\sqrt{2\cdot 7}$.

$\sqrt{\cdot 001369} = \cdot 037$,
$\sqrt{2\cdot 7} = \sqrt{2\frac{7}{10}} = \sqrt{\frac{27}{10}} = \frac{3}{5}$;
∴ Decimal = $\frac{\cdot 037}{5}$
= $\frac{\cdot 111}{5}$
= ·0222. Ans.

Note.—The solution of the other query appeared in our issue for November, 1882.

9. P. T.—Three candidates stand for a borough of 12,000 inhabitants, of whom $\frac{4}{5}$ possess the elective franchise. A polls 3 per cent. of the whole population, B polls 15 per cent. of the electors, and C polls 20 per cent. of those who actually voted. Give the number polled by each candidate.

No. of electors = $\frac{4}{5}$ of 12,000 = 1,600;
A polls 3 per cent. of 12,000 = 360;
B ,, 15 ,, ,, ,, 1,600 = 240;
80 per cent. of voters = 360 + 240,
$\frac{1}{5}$,, = 600,
∴ No. of voters = 600 × 5
= 750;
C polls 20 per cent. or of 750 = 150.

10. WILBERFORCE.—If 14 men, 15 women, and 20 boys, the men working for 15, the women 10, and the boys for 18 days of 9 hours long, can finish $\frac{7}{10}$ of a certain work, what part of the work would 18 men, 12 women, and 24 boys do, the men working 16, the women 9, and the boys 20 days of 8 hours long, supposing in the former case 2 men are equal to 3 women or to 4 boys, and in the latter case 1 man is equal to 2 women or to 3 boys? (*Bryant.*)

In former case,
2 men can do as much as 4 boys,
∴ 14 ,, ,, ,, 28 ,, ;
3 women ,, ,, 4 ,, ,
∴ 15 ,, ,, ,, 20 ,, ;
∴ Part done by all
= Part done by {(28 × 15) + (20 × 10) + (20 × 18)} boys in 9 hours
= Part done by {420 + 200 + 360} boys in 9 hours
= Part done by 980 boys in 9 hours.

In latter case,
1 man can do as much as 3 boys,
∴ 18 men ,, ,, ,, 54 ,, ;
2 women ,, ,, 3 ,, ,
∴ 12 ,, ,, ,, 18 ,, ;
∴ Part done by all
= Part done by {(54 × 16) + (18 × 9) + (24 × 20)} boys in 8 hours
= Part done by {864 + 162 + 480} boys in 8 hours
= Part done by 1506 boys in 8 hours.

Part done by 980 boys in 9 hours = $\frac{7}{10}$ of the work,
,, ,, ,, 1 boy ,, 1 hour = $\frac{7}{10 \times 980 \times 9}$,, ,, ,,
,, ,, ,, 1506 boys ,, 8 hours = $\frac{7 \times 1506 \times 8}{980 \times 9}$,, ,, ,,
= $\frac{251}{35}$ of the work. Ans.

11. STUDENT.—Given $\sqrt[3]{10} = 2\cdot 154435$ and $\sqrt[3]{100} = 4\cdot 641589$, find the cube roots of 5065300, 506530, 50653, 5065·3, and 506·53. (*Science and Art*, 1881.)

50'653(37
27
$3^2 \times 300 = 2700$ | 23653
$3 \times 7 \times 30 = 630$
$7^2 = 49$
3379 | 23653

$\sqrt[3]{5065300}$
$= \sqrt[3]{50653 \times 100}$
$= \sqrt[3]{50653} \times \sqrt[3]{100}$
$= 37 \times 4\cdot 641589$
$= 171\cdot 738793.$

$\sqrt[3]{506530}$
$= \sqrt[3]{50653 \times 10}$
$= \sqrt[3]{50653} \times \sqrt[3]{10}$
$= 37 \times 2\cdot 154435$
$= 79\cdot 714095.$

$\sqrt[3]{5065\cdot 3}$
$= \sqrt[3]{50653 \div 10}$
$= \sqrt[3]{50653} \div \sqrt[3]{10}$
$= 37 \div 2\cdot 154435$
$= 17\cdot 173876.$

$\sqrt[3]{506\cdot 53}$
$= \sqrt[3]{50653 \div 100}$
$= \sqrt[3]{50653} \div \sqrt[3]{100}$
$= 37 \div 4\cdot 641589$
$= 7\cdot 971408.$

Note.—Each correspondent is restricted to *one* question. Please repeat the other query for next month, as you must have given it incorrectly; it is stated that the second-class fare is less than the third-class.

12. J. P. B.—Simplify $\frac{2\times\sqrt{1+\frac{3}{4}}\div\sqrt{1-\frac{3}{4}}}{5\times\sqrt{1+\frac{3}{4}}\times\sqrt{1-\frac{3}{4}}}$ (*Barnard Smith.*)

$$\frac{2\times\sqrt{1+\frac{3}{4}}\div\sqrt{1-\frac{3}{4}}}{5\times\sqrt{1+\frac{3}{4}}\times\sqrt{1-\frac{3}{4}}}$$

Dividing numerator and denominator by $\sqrt{1+\frac{3}{4}}$,

$$=\frac{2\div\sqrt{\frac{1}{4}}}{5\times\sqrt{\frac{1}{4}}}$$

$$=\frac{2}{5\times\sqrt{\frac{1}{4}\times\frac{1}{4}}}$$

$$=\frac{2}{5\times\frac{1}{4}}$$

$$=\frac{2}{\frac{5}{4}}$$

$$=\frac{8}{5}.\text{ Ans.}$$

Note.—You will find another method of solution in our issue for March, 1882.

13. G. MANUELL AND LANE SIDE.—The owner of some $3\frac{1}{2}$ per cent. stock spends in a certain year 75 per cent. of his net income, after an income tax of 6d. in the £ has been deducted from the interest due to him. The next year the income tax is reduced to 3d. in the £, but the rate of interest being also reduced to 3 per cent., he only spends $68\frac{3}{4}$ per cent. of his net income. He then finds his surplus to be £8 11s. more than in the previous year. How much stock did he possess? (*Excise*, 1882.)

In 1st case, income on £100 stock = £3 5s.,
" " " net income " " = £3 5s. − 1s. $7\frac{1}{2}$d.
= £3 3s. $4\frac{1}{2}$d.,
∴ Amount saved from this income = 25 % or $\frac{1}{4}$ of £3 3s. $4\frac{1}{2}$d.
= 15s. $10\frac{1}{2}$d.

In 2nd case, income on £100 stock = £3,
" " " net income " " = £3 − 9d.
= £2 19s. 3d.,
∴ Amount saved from this income = $31\frac{1}{4}$% or $\frac{5}{16}$ of £2 19s. 3d.
= 18s. $6\frac{3}{16}$d.

Difference in amounts saved on incomes from £100 stock
= 18s. $6\frac{3}{16}$d. − 15s. $10\frac{1}{2}$d.
= 2s. $8\frac{11}{16}$d.

s.	d.	£	s.	£	
2	$8\frac{11}{16}$	8	11	100	Amount of stock
12		20			
32		171			
16		12			
539		2052			

4
= £(4 × 16 × 100) stock
= £6400 stock. Ans.

14. MAJOR CHARTA.—A crown weighing $64\frac{1}{2}$ oz. was made of gold adulterated with silver. It was found, by the water which it displaced, to contain 8·5 cubic inches of metal, and a cubic inch of gold was found to weigh 10·25 oz., and of silver 5·75 oz. Find the weight of gold and silver in the crown. (*Exam. for Men Clerks, Lower Division*, November, 1882.)

Difference in weight between a cub. in. of gold and a cub. in. of silver = (10·25 − 5·75) oz.
= 4·5 oz.;
Weight of crown if composed of silver alone = (5·75 × 8·5) oz.
= $(5\frac{3}{4}\times 8\frac{1}{2})$ oz.
= $(\frac{23}{4}\times\frac{17}{2})$ oz.
= $\frac{391}{8}$ oz.;
∴ Quantity of gold in crown = $\{(64\frac{1}{2}-\frac{391}{8})\div 4\cdot5\}$ cub. in.
= $\left\{\frac{516-391}{8}\div\frac{9}{2}\right\}$ cub. in.
= $\left(\frac{125}{8}\times\frac{2}{9}\right)$ cub. in.
= $\frac{250}{72}$ cub. in.;
∴ Weight of gold in crown = $(10\cdot25\times\frac{250}{72})$ oz.
= $(\frac{41}{4}\times\frac{250}{72})$ oz.
= $\frac{5125}{144}$ oz.
= $35\frac{85}{144}$ oz.;
" " " " = $(64\frac{1}{2}-35\frac{85}{144})$ oz.
" " silver " " = $28\frac{59}{144}$ oz.

15. ANTI-KREOPHAGIST.—13 horses do the same work as 20 ponies, and 12 horses can just draw a certain load on a level road; how many ponies along with 5 horses could draw a load $\frac{1}{9}$ as heavy up a gradual slope, which makes the fraction more laborious by $\frac{1}{8}$ for ascent and $\frac{1}{10}$ for roughness?

No. of horses required = $12\times\frac{1}{9}\times\{1+(\frac{1}{8}+\frac{1}{10})\}$
= $\frac{4}{3}\times\{1+\frac{9}{40}\}$
= $\frac{\cancel{4}}{\cancel{3}}\times\frac{\cancel{49}}{\cancel{40}}$
= $6\frac{3}{10}$;
∴ No. of ponies required with 5 horses = $1\frac{3}{10}\times\frac{5}{1\frac{1}{3}}$
= $\frac{13}{10}\times\frac{5}{\frac{4}{3}}$
= 2. Ans.

Algebra.

1. ASHBURTON.—A person borrowed £1,050 at 5 per cent. compound interest, to be repaid by 12 annual equal payments. Find the amount of an annual payment.

Let A denote an annual payment in pounds, n the number of years, R the amount of one pound in one year, and P the amount of the loan in pounds.

Then, $PR^n=\frac{R^n-1}{R-1}A$;

$$\therefore\ 1050\times(\tfrac{21}{20})^{12}=\frac{(\frac{21}{20})^{12}-1}{\frac{21}{20}-1}A,$$

$\text{Log}\left(\frac{21}{20}\right)^{12}$ = (log. 21 − log. 20) × 12
= (1·3222193 − 1·30103) × 12
= ·0211893 × 12
= ·2542716
= log. 1·795856.

$1050\times 1\cdot795856=\frac{1\cdot795856-1}{\frac{1}{20}}A$,

$105\times\cdot897928=\cdot795856A$,

$\therefore A=\frac{94\cdot28244}{\cdot795856}$£

·795856)94·28244(118£
795856
1469684
795856
6738280
6366848
371432
20
7428640(9s.
7162704
265936
12
3191232(4d.
3183424
7808

= £118 9s. 4d. Ans.

2. QUAESITOR.—Two trains, 92 feet and 84 feet long respectively, are moving with uniform velocities on parallel rails; when they move in opposite directions, they are observed to pass each other in one second and a half; when they are moving in the same direction, the faster train is observed to pass the other in six seconds. Find the rate at which each train moves. (*Todhunter and Hamblin Smith.*)

Let x = rate per second of faster train in feet,
And " y = " " other " " ;
Sum of lengths of trains = (92 + 84) ft.
= 176 ft.;

$$\therefore\ (1)\ \frac{176}{x+y}=1\tfrac{1}{2}$$
$$(2)\ \frac{176}{x-y}=6$$

(1) $3x+3y=352$
(2) $6x-6y=176$
(1) $6x+6y=704$
(2) $6x-6y=176$

Adding, $12x = 880$

$\therefore \underline{x = \frac{220}{3}}$.

Subtracting, $12y = 528$

$\therefore \underline{y = 44}$.

Rate of faster train per hour $= \frac{\cancel{22}^{10} \times \cancel{88}^{5}}{\cancel{3} \times \cancel{22} \times \cancel{88}_{\cancel{4}}}$ mls.

$= 50$ miles;

„ other „ $= \frac{44 \times \cancel{88}^{30} \times \cancel{88}^{\cancel{4}}}{\cancel{22} \times \cancel{88}_{\cancel{4}}}$ mls.

$= \underline{30 \text{ miles}}$.

Note.—No doubt you will notice that the answer in book is the rate per hour in miles, whereas you have understood it to be the rate per second in feet.

3. HAZY.—Solve:—

$$\left.\begin{array}{l}(1)\ \frac{x}{a}+\frac{y}{b}=1\\(2)\ \frac{x}{a}+\frac{z}{c}=1\\(3)\ \frac{y}{b}+\frac{z}{c}=1\end{array}\right\}$$

$$\left.\begin{array}{l}(1)\ \frac{x}{a}+\frac{y}{b}=1\\(2)\ \frac{x}{a}+\frac{z}{c}=1\end{array}\right\}$$

Subtracting, $\left.\begin{array}{l}(4)\ \frac{y}{b}-\frac{z}{c}=0\\(3)\ \frac{y}{b}+\frac{z}{c}=1\end{array}\right\}$

Adding, $\frac{2y}{b}=1$

$\therefore \underline{y=\frac{b}{2}}$.

Subtracting (4) from (3), $\frac{2z}{c}=1$

$\therefore \underline{z=\frac{c}{2}}$.

$(1)\ \frac{x}{a}+\frac{y}{b}=1$

$\frac{x}{a}+\frac{1}{2}=1$

$\frac{x}{a}=\frac{1}{2}$

$\therefore \underline{x=\frac{a}{2}}$.

4. INQUISITIVE.—Simplify:—

$$(1)\ 2(a^2-b^2)^2 \div \left\{\frac{a}{\frac{1}{a-b}+\frac{1}{a+b}}+\frac{b}{\frac{1}{a-b}-\frac{1}{a+b}}\right\};$$

$$(2)\ \frac{(3x^2+4x+9)^2-(3x^2+12x+9)^2}{(3x^2+10x+9)^2-(3x^2+6x+9)^2};$$

$$(3)\ \frac{[px^2+(k-s)x+r]^2-[px^2+(k+s)x+r]^2}{[px^2+(k+t)x+r]^2-[px^2+(k-t)x+r]^2}.$$

(*M. A. Examination, Edinburgh University.*)

$$(1)\ 2(a^2-b^2)^2 \div \left\{\frac{a}{\frac{1}{a-b}+\frac{1}{a+b}}+\frac{b}{\frac{1}{a-b}-\frac{1}{a+b}}\right\}$$

$$=2(a^2-b^2)^2 \div \left\{\frac{a}{\frac{a+b+a-b}{a^2-b^2}}+\frac{b}{\frac{a+b-a+b}{a^2-b^2}}\right\}$$

$$=2(a^2-b^2)^2 \div \left\{\frac{a}{\frac{2a}{a^2-b^2}}+\frac{b}{\frac{2b}{a^2-b^2}}\right\}$$

$$=2(a^2-b^2)^2 \div \left\{\frac{a^2-b^2}{2}+\frac{a^2-b^2}{2}\right\}$$

$$=2(a^2-b^2)^2 \div (a^2-b^2)$$

$$=\underline{2(a^2-b^2)}. \text{ Ans.}$$

$$(2)\ \frac{(3x^2+4x+9)^2-(3x^2+12x+9)^2}{(3x^2+10x+9)^2-(3x^2+6x+9)^2}$$

$$=\frac{\{(3x^2+9)+4x\}^2-\{(3x^2+9)+12x\}^2}{\{(3x^2+9)+10x\}^2-\{(3x^2+9)+6x\}^2}$$

$$=\frac{(3x^2+9)^2+8x(3x^2+9)+16x^2-\{(3x^2+9)^2+24x(3x^2+9)+144x^2\}}{(3x^2+9)^2+20x(3x^2+9)+100x^2-\{(3x^2+9)^2+12x(3x^2+9)+36x^2\}}$$

$$=\frac{-16x(3x^2+9)-128x^2}{8x(3x^2+9)+64x^2}$$

$$=\underline{-2}. \text{ Ans.}$$

$$(3)\ \frac{[px^2+(k-s)x+r]^2-[px^2+(k+s)x+r]^2}{[px^2+(k+t)x+r]^2-[px^2+(k-t)x+r]^2}$$

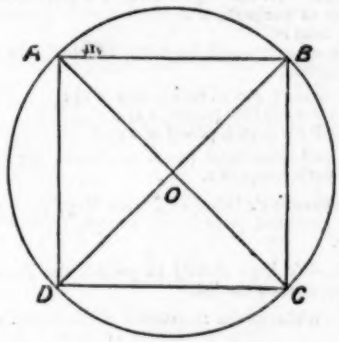
$$=\frac{\{(px^2+kx+r)-sx\}^2-\{(px^2+kx+r)+sx\}^2}{\{(px^2+kx+r)+tx\}^2-\{(px^2+kx+r)-tx\}^2}$$

$$=\frac{-4sx(px^2+kx+r)}{4tx(px^2+kx+r)}$$

$$=\underline{-\frac{s}{t}} \text{ Ans.}$$

Mensuration.

1. CARN BREA AND ANXIOUS.—An iron beam, whose vertical section is 8 inches square, is passed horizontally through a wooden cylinder, whose axis is vertical and whose diameter measures $8\sqrt{2}$ inches, so that equal portions of the width of the beam are on each side of the axis of the cylinder. What volume of wood must be cut away so as just to let the beam pass through? (*Excise*, 1882.)



Let figure represent section of cylinder, AB and DC representing breadth of beam.

AB represents 8in., and BD $8\sqrt{2}$ in.

$BD^2 = AB^2 + AD^2$, (I. 47.)

$(8\sqrt{2})^2 = 8^2 + AD^2$,

$64 \times 2 = 64 + AD^2$,

$AD^2 = 64$,

$\therefore$ AD $= 8$.

Wherefore ABCD is a square.

Sector ABO is a quadrant.

Area of circle $= (8\sqrt{2})^2 \times \cdot 7854$

$= 128 \times \cdot 7854$;

Area of quadrants ABO and CDO $= \frac{1}{4}$ area of circle

$= 64 \times \cdot 7854$

$= 50 \cdot 2656$;

Area of triangles AOD and COB $= \frac{1}{4}$ of 8^2

$= 32$;

$\therefore$ Volume of wood to be cut away $= \{(50 \cdot 2656 + 32) \times 8\}$ cub. in.

$= \{82 \cdot 2656 \times 8\}$ cub. in.

$= \underline{658 \cdot 1248}$ cub. in. Ans.

General.

1. VENT.—Has any reader of the PRACTICAL TEACHER applied Dr. Carpenter's plan of warming and ventilating as described in the number of this periodical for October, 1881, page 366? If so, would such reader be willing to communicate, either in these columns or privately, the details of such practical application?

2. W. B. STEER.—Infinitives admit modifying forms, descriptive more or less of time; as, to write, to be writing, to have written. In parsing a verb in the infinitive mood, state the tense (indefinite, imperfect, or perfect—without regard to present, past, or future). Infinitives have no subject, and therefore have no number and person.

3. HAIRBRAIN.—(1) We think not; but some hold a contrary opinion. (2) No.

4. ROMEO II.—You will find the solution of your query in our issue for July, 1882.

5. M. H.—The solution of your query appeared in our issue of May, 1882.

6. MALDONADO.—Your query is solved in our issue for March, 1883.

7. BIRKSHEAD.—The solution of your query from *Colenso* appeared in our previous issue.

8. JONAS ORAGMUS.—If it is 5 o'clock in the afternoon at some place when it is 12 o'clock at midnight at Greenwich, what is the difference of longitude, and is it east or west? Give reasons for your answer.

Difference of longitude for difference of one hour
$= 360° \div 24$
$= 15°$,
∴ " " " " 7 hours
$= 15° \times 7$
$= 105°$

As it is earlier at the place than at Greenwich, it is situated west of Greenwich.

∴ Longitude of place $= 105°$ west.

9. QUAESITOR.—As the logarithm of 2 is given correct only to seven places of decimals, it is impossible to obtain the 64th power exactly from it.

In the given case it would be better to obtain the result by the ordinary method.

$2^2 = 4$; $4^2 = 16$ (4th power of 2);
$16^2 = 256$ (8th power of 2);
256^2 gives 16th power of 2;

this result squared gives 32nd power of 2; and the last result squared gives 64th power of 2.

10. L. B.—*Gardiner's* 'How to Draw a Map,' price 1s. Upon receipt of the published price in ½d. stamps, we will send the book post free.

11. YRREB.—We hope shortly to publish the list of books used by the top man on the list.

12. ROGO.—Write to the secretaries of the training colleges you mention.

13. PRECEPTOR.—*Whitney's* 'Language and the Study of Language' is published by Trübner, at 5s.; *Marsh's* 'Lectures on the English Language,' and 'The Origin and History of English Language of the Early Literature it Embodies,' are one book, published by Lowe, at 15s. Any bookseller will procure it for you.

14. SIGMA.—Your query is held over, and will appear in our next issue.

15. MANNA.—Geometry—*Wright's* 'Geometry,' *Pactile's* 'Co-ordinate Geometry'; Trigonometry—*Hamblin Smith's* 'Elementary Trigonometry'; Classics—'Classics for English Readers,' 'Xenophon' (*Collins*); History of England—*J. H. Green's* 'Smaller History'; English Language—*Morley's* 'English Literature.'

16. W. S. C.—(*a*) Values of Staff Notation and T. S. F. *equal*. (*b*) *Curwen's* 'Musical Theory,' Book I., price 4d. (both notations).

17. WAMBA.—Projections *must* be made on mathematical principles. See *Langley's* 'Mathematical Geography.' 'How to Draw a Map' is also useful.

18. FILIUS.—We believe the 'Drawing' marks obtained in May are added to the marks gained at any following July Q.S. Examination.

19. LIBRA.—If the weekly lessons in the *Governess* are not sufficiently frequent, purchase Gasc's or Fasnacht's course.

20. W. A.—Your writing is very good. Gladman's 'Notes on School Management' will be found useful.

21. ESTON NAB.—Your chance of obtaining a place in the 'First Division, Second Year's Papers,' will be very slight if you base it on 'three drawings and two sciences.' These will be helpful, however, in case the 'essential work' is done, not only well, but in a superior manner. The grammar of the Latin paper will certainly be of some value.

22. JUSTICE.—Art. 68 of the Code provides that re-examination for a certificate cannot take place 'more than once in every two years.' A teacher who sat in 1882 will be allowed to sit again in 1884.

23. J. M. W.—The needful knowledge of the planetary system is found in almost any advanced reading-book. Langley's 'Popular Astronomy' (6d.) contains a sufficient outline.

24. ANXIOUS must wait and redeem the time until 1884.

25. A. B. C.—'Stipendiary monitors' is a term unknown to the New Code. Monitors are allowed temporarily (Art. 85). Candidates for pupil-teachership, to be accepted, must be able to pass Standard V. or VI. See Code, Art. 40, 41. A higher standard is required for apprenticeship, and candidates must receive due instruction.

26. GEO. W.—You cannot take pupil-teacher's papers as you have not been apprenticed. You may sit for a scholarship in July, and if you pass, as you are twenty years of age, for a certificate in December, 1884, or when you have served at least twelve months as a qualified assistant (Art. 57).

27. S. C. H.—The value of the marks attached to any subject of examination is not now published. Whatever 'first-class' or 'advanced' you gain in May, at the science examination, in *one* subject, will be placed to your credit in July if you are a P.-T. (Code, Schedule V.).

28. AMESBURY.—We believe you will. The New Code is in force from May 1st. We know of no exceptional arrangements for P.-T.'s.

29. A. C. P.—Write to C. R. Hodgson, Esq., B.A., Secretary to College of Preceptors, 42, Queen Square, Bloomsbury, W.C.

30. ALFRED.—You write well, but do not let your hand become 'angular.' 'I would have went' should be 'I would have gone.'

31. FOLKESTONIAN can take the blackboard exercise at a training college in the autumn, by permission of the college authorities.

32. I. W. H.—Apply to the secretary, National Society, Broad Sanctuary, Westminster.

—o—

National Union of Elementary Teachers.

FOURTEENTH ANNUAL CONFERENCE.—NEWCASTLE-ON-TYNE.

THE Fourteenth Annual Conference of the National Union of Elementary Teachers was held at Newcastle-on-Tyne, on Monday, March 26th, 1883, and the three following days. A larger number of representatives assembled than had been expected to attend a meeting so far North, and the proceedings throughout were of a business-like and enthusiastic character. The most careful preparations for the success of the gathering and for the comfort of visitors had been made by the Local Conference Committee, under the able presidency of Mr. Scott, B.A., of South Shields, with Mr. A. Traill, of North Shields, as secretary. On their arrival the representatives were welcomed by the Reception Committee, and their creature comforts were well looked after by its indefatigable Secretary. At 6 p.m. on Easter Monday the retiring President, Mr. R. Sykes, took the chair and opened the proceedings by declaring the Conference open, and bidding all a welcome to Newcastle-on-Tyne. A hearty reception was given to each of the officers and members of the Executive as they appeared and were recognised by the assembly.

The first business was the election of scrutineers, whose duty it was to count the votes in the various elections, and to take any division that might be demanded during the debates of Conference. 'Standing orders' for regulating the business were next adopted, and we may note in passing that for the past eight years 'Cloture by a bare

majority' has been adopted and found to work satisfactorily. Questions having been asked and answered respecting the method of voting, the minutes of the Sheffield Conference were taken as read, copies having been for some days in the hands of members, and signed as a correct record of the proceedings.

Mr. GREENWOOD (treasurer) then moved a vote of thanks to Mr. Sykes, the retiring President, 'for his valuable services to the Union during the past two years,' and expressive of 'the best wishes for his future welfare.' In a happy little speech Mr. Greenwood fairly expressed the high opinion held of Mr. Sykes by teachers at large, and quoting from 'high authority,' viz., the pages of *The Governess*, he said that Mr. Sykes possessed the rare combination declared by that authority to be necessary in a President of the Union: '(1) Intellectual vigour, (2) sound judgment, (3) high professional success, and (4) a knowledge of public business.' The motion was seconded by Mr. GIRLING, who bore testimony to the work of Mr. Sykes and to his devotion to the Union, and was carried with acclamation. It was further agreed to inscribe the vote on vellum, and to present it to Mr. Sykes as a memento of his years of office.

Mr. SYKES responded to the vote in suitable terms, alluding to the work of the past year, to the successful Conference of M.P.'s held last August, and to the success of the Union in influencing the tone of the 'Instructions to Inspectors.' He concluded by saying that if the Union had been necessary in the past, still more would it be necessary in the future, as he believed they were only on the threshold of their work. Much yet remained to be accomplished, and he hoped that in the ensuing year a strong effort would be made to bring all teachers into the Union; but he felt confident as to the future, and believed that if all put their shoulders to the wheel they would raise the teaching profession to a position of dignity second to none. With regard to the inscription on vellum, he should value it most highly, and give it a conspicuous position in his house as a memorial of their goodwill in conferring upon him the greatest honour they could bestow. (Applause.)

Mr. Sykes then introduced the new President, and installed him in his office for the two ensuing years. He said it was unnecessary to sound the praises of Mr. Dawson, who was a ripe scholar, a successful teacher, and a genial, kind-hearted gentleman.

Mr. DAWSON, B.A., then took the chair amid loud cheers, and delivered his inaugural address, which, notwithstanding its length, was received with much favour, and sustained the attention of a crowded audience to its last sentence. After a graceful introduction, in which allusion was made to the fact that many years before the speaker had been the 'master of a humble colliery' school near Newcastle, he gave the following

RETROSPECT OF NATIONAL EDUCATION.

First, a few words on its origin and growth. In this country national education, like many other elements of social progress, may be almost said to have had its inception during the reign of our present sovereign. It is true that there were schools called National Schools very early this century. They were, however, in no way under the charge of the nation; they were the creation of the Church. Their existence was due to the efforts of a number of clergymen and laymen of the Church of England who, in 1811, formed themselves into the National Society for Promoting Education, and especially religious education amongst the poor.

Mr. Dawson then gave an outline of the steps taken between 1811 and 1834—referred to the first Government grants in that year, and traced their growth to 1859, when the Duke of Newcastle's Commission made a report. The introduction of the Revised Code and its effects were next dealt with.

The next decided move was led up to by the extension of the franchise in 1868. This event called forth from those who dreaded the effects of political power, wielded by an untaught people, the cry, "We must educate our masters;" and, at the same time, a popular demand began to rise for an extended scheme of national education. It was observed, too, that foreign countries in which the people had been for some years under a good system of instruction were running England dangerously close in the race for industrial supremacy. Hence came the Education Act of 1870, in which, for the first time, the law recognised the principle of applying compulsion to education. The formation of School Boards for boroughs and parishes was authorised wherever the ratepayers were favourable to it, and was required in all those districts where the necessary school accommodation did not exist and was not supplied by voluntary effort within a certain period of grace. The School Boards, when formed, as they were, by popular election, were empowered and required to build schools that were needed, and to levy rates for their maintenance. They might also enforce the attendance of children at school.

Since 1870 several Acts have been passed to amend Mr. Forster's Act, notably one in 1876, requiring districts which did not wish for a School Board, and did not need one on the ground of insufficient school accommodation, to constitute a local authority for securing attendance at school, and this the School Attendance Committee might do if it pleased by rules for compulsion. A later Act, passed in 1880, insists on School Boards and other local authorities making use of their compulsory powers. There seems, however, reason to fear that many of these local bodies do not yet fully realise, or do not intend to perform properly, the duties imposed upon them; for in many of the country districts the means adopted to secure attendance are notoriously inadequate, and gross irregularity appears to be connived at.

PRESENT ASPECT—OVER-EXAMINATION.

There has been for many years a gradual increase of the requirements in elementary instruction; and there has been a remarkable growth in the number and stringency of examinations. Over-examination and its natural consequence, over-pressure of the pupils, are two terrible evils in the existing system that cry out for resistance and remedy. The examination craze, we must remember, is not confined to elementary schools. It is running to excess in other directions; but it is nowhere more injurious than in elementary schools, because there it affects a larger number of individuals than elsewhere, and is not applied to voluntary or selected candidates as in the various competitive examinations, but to all who fulfil certain conditions of attendance at school. It would almost seem as if some people thought the chief purpose for which schools exist was that they might be examined. Teachers indeed seem driven, by regard for the momentous personal issues placed on the results of examinations, and by the consequent necessity of bending all their energies towards preparing for them, to look upon examination as the sole end of their work. But surely this ought not to be so. The education which it is the teacher's business to give, is intended for something more important than to be tested by an inspector. It is to afford means to create conditions for a fuller, fresher, truer life in its subjects than is possible without it, to help them to fulfil the laws of their being, to realise the possibilities of their nature, and to minister to the good of the society whereof each of them forms a part.

THE NEW CODE.

Many of my fellow-teachers cherish gloomy anticipations with regard to the new Code; in these I cannot say I share to any large extent. I believe that in spite of some marked defects, the new Code is the best we have had to work under; that it embodies an honest as well as an avowed attempt to raise the character of elementary education, and to give the teacher greater freedom from anxiety. To those who are so despondent about its possible effects, may be quoted the lines with which one of the former Inspectors strove to quell the fears of the teachers on the issue of the Code of 1862:—

> 'Fear not, my friends, fresh courage take;
> The clouds ye so much dread
> Are big with mercy, and shall break
> In blessings on your head.'

For one thing, it is intended to provide for the recognition of merit on a sounder principle than that of percentage of passes.

THE CHIEF BLOT—PERCENTAGE.

It is, perhaps, unfortunate that the element of percentage of passes should occupy so prominent a place in the new Code. The fact that this element alone determines the assessment of the grant for elementary subjects, and also, in a rather different way, for the class subjects, should, in my opinion, exclude it altogether from any share in regulating the merit grant. This grant, we are led to understand, is intended to correct the estimates based on percentages of passes, because the latter are known to be fallacious and misleading as measures of merit; and

a most palpable fallacy would be involved in allowing a corrective process to be influenced by the very criterion whose untrustworthiness it is intended to neutralise. But we know what a fatal fascination figures have for some minds, and from the remarks of some of the Inspectors it is to be feared that unless their final instructions are very definite on this point, some of them may regard it as part of their duty to construct from the Code and Instructions a sort of *centigrade mathemometer* by which to determine the educational merit of a school by merely countable and measurable results.

Mr. Dawson then illustrates the evils of reliance on 'percentages' by the case of a School Board and by the fallacy of a present comparison of results as shown by percentages between schools in Ireland and in England. A suggestion for securing greater uniformity of standard is then given, and the efforts of Mr. Mundella in this direction are duly acknowledged.

UNIFORMITY OF STANDARD—A SUGGESTION.

Mr. Dawson then makes a practical suggestion for effecting greater uniformity of Standard in Examinations, and goes on to say :—

If, however, the changes in the examinations under the new Code should, as is for the present probable, be much less sweeping than the one I have advocated, it is none the less our duty to cast off feelings of doubt and despondency as to the effects of the new Code, not only because despondency is weakening and enervating, but because we can find good grounds for a more cheerful outlook. It is proverbial that what is unknown is commonly regarded as full of dangers; so it is easy to understand why many teachers are so fearful and anxious about the new *régime*, especially about the new powers of inspectors. But it would be unwise, as well as unfair, to harbour distrust of the inspectors. They, as well as ourselves, are about to traverse a *terra incognita*. We look to them for sympathy and confidence; let us strive to regard them with similar feelings. They will surely have to bear an additional burden in carrying out the new regulations. We know they will expect us to conform to the Articles of the Code, and we may as justly expect them to act loyally in the spirit of the 'Instructions.' We may surely credit them with the ability and the desire to rise to the level of their enlarged responsibilities.'

On the subject of expense, Mr. Dawson sums it all up in a quotation from a speech by the Mayor of Oldham, who, in reply to a complaint of a School rate of 3d. in the pound, said, 'If we must economise, let us begin with something other than education.'

Several paragraphs deal with the efforts of School Boards to establish higher elementary schools, and particularly with that of Manchester to grade their schools. A suggestion is made that by co-operation among themselves, the managers of voluntary schools in town districts might also introduce the principle of graded schools, and reap the benefits of superior organisation. Mr. Dawson then suggests a scheme for the development of our existing secondary schools.

DEVELOPMENT SUGGESTED.

The system needs further development; and I venture to urge that a Secondary Education Act should be passed, by which localities should be required to ascertain the relation of the supply to the need for secondary schools, and to make good any proved deficiency. This would necessitate several other steps. In the first place, the encouragement and assistance of the State would be required. The character of the instruction would have to be carefully considered and determined. Then these intermediate schools should be connected with the elementary schools by Scholarships, so that the most clever pupils in the latter should have an opportunity of improving their talents by the more advanced education. In spite of the fewness of facilities, there are instances of boys who have been trained in our elementary schools who have attained high distinctions in the Universities of Oxford and Cambridge, to say nothing of a larger number who have graduated with honours at the London University. And with such facilities as a better organised scheme of secondary instruction would afford, such instances would be far more numerous.

To give effect to the proposal, Mr. Dawson would give the School Boards, if reorganised in country districts, the control of the intermediate schools, and to the Education Department the general supervision, under the control of a Minister of Education. The present time and the present Vice-President were most fitting for the carrying out of such a reform. The address next deals with Technical Education 'as a pendant to secondary education, of which, indeed, it may be regarded as a variety.' Describing the efforts made in Bradford, Leeds, Nottingham, and other large towns, and by the Guilds of London, the President goes on to urge that such instruction should be kept clear of the Elementary School, and indeed that a reduction of the amount of needlework, a species of Technical Education, should be effected for the relief of Girls' and Infants' Schools. The 'Position of Elementary Teachers' and the 'Work of the N.U.E.T.' are the next topics touched upon in the address. With reference to the latter subject, Mr. Dawson says :—

In the first place its policy has not been, in any objectionable sense, aggressive; some may even think it has erred in the opposite direction. It has gone on no narrow line for merely selfish objects. It has placed the advancement of education at the very head of its programme. It has been the means of collecting and disseminating useful information on education; and you will presently be asked to agree to a resolution to send a special commissioner into several selected districts to inquire into the way in which local authorities are dealing with the important matter of school attendance. It has further been instrumental in informing and influencing the action of members of Parliament. Witness the conference of nearly 120 members on points in the Code. It has afforded means of communication between Inspectors of Schools and teachers, and so strengthened the bonds of sympathy and goodwill which should subsist between them. It has been a channel for representing the wishes of teachers to the Education Department, and the value of its assistance has been publicly acknowledged by Lord Spencer and the Vice-President of the Council. It has influenced the construction and revision of successive Codes, and the last to such an extent that it has been called the Teachers' Code.

The Rights and Claims of teachers were illustrated by several examples. On the common law right of the teacher to inflict corporal punishment if necessary, and on that of appeal, the President says :—

It is generally understood that in common law the teacher, standing *in loco parentis*, has the right to inflict corporal punishment if necessary. Now, no right-thinking or right-feeling man or woman would wish to flog a child if it were not needful. But some sentimental persons, magistrates among them, who would never think of interfering with this right in one of the great public schools, wish to override the law, and would deprive the teacher of this means of securing obedience to lawful authority. Even the Education Department seems to lend itself to this notion in the recent Instructions to Inspectors, and so to hold the teacher responsible for discipline while it fetters him as to the means of obtaining it. Another right is that of appeal in case of being charged with any delinquency. So much of this right as is now enjoyed by Elementary Teachers has been secured through the persistent efforts of the Union.

The Claims to be urged are also illustrated by examples. *Pensions* for those to whom the promises were made must be more adequately provided. The 'arrears' accruing during the thirteen years the Pension Minutes were in abeyance should be applied to an extension of the Pension Fund. *Security of tenure* was also necessary, and should be claimed.

A few well-timed words of counsel to young teachers are given, and they are reminded that 'public consideration is not yielded to clamour.' The excellence of the arrangements of the Teachers' Provident Society is pointed out, and in a few eloquent words the value of a high aim of life, morals, and work is plainly set forth.

AN IDEAL.

The President then gives us a peep into the future, and depicts the state of educational arrangements as he would wish to see them at the beginning of the twentieth century.

There should then be a tolerably complete system of national education—primary, secondary, and higher, connected into an organic whole. There should be a united profession of teachers

registered and protected by law. Facilities should exist for the passage of boys and girls of talent from the elementary school through secondary and high schools to the Colleges and Universities; and, in like manner, there should be means of promotion for able and liberally educated teachers from the lower to the higher grade of schools, and to the post of inspector and examiner. In the primary and lower secondary schools, as well as in the higher ones, should be found as teachers a fair and growing proportion of graduates of Oxford, Cambridge, and London, and amongst them some hailing from Girton, Newnham, and other similar colleges. Amongst the Inspectors of Schools should be a good sprinkling of such as have had practical experience in the work of primary instruction, as well as the benefit of their own higher education. Technical schools should be established in all large towns and certain centres of rural districts, and should be so arranged as to be available for, and specially useful to, the artisans and others of the locality. Secondary, as well as primary, schools should be under local control, and aided, in such ways as might be needed, by the State. The whole scheme should have relations with a Government Department under a responsible Minister of Public Instruction; while an Educational Council should have the task of controlling the teaching profession. After the experience of a complete generation under the Education Act, the people should have become so accustomed to the effects of compulsion, as to have forgotten its irksomeness in a cheerful and almost unconscious compliance with the law. With this programme fulfilled, the nation should surely rejoice in the wealth of her mental resources, and in the benefit accruing therefrom, as truly as, for some time past, she has rejoiced in the abundance and advantage of her material resources.

Mr. BIRKBY, of Newcastle, proposed a vote of thanks to Mr. Dawson for his able address. This was seconded by Mr. E. WILKES SMITH (Thames Valley), and carried by acclamation.

It was immediately afterwards agreed to send a telegram to Mr. Mundella, expressing the sympathy of the Conference with him in his illness.

Mr. WILD, B.A., moved the adoption of the Annual Report, which contained a mass of facts and figures respecting the work of the Union during the past year.

Mr. COLLINS (Southwell) seconded the adoption of the report, which was agreed to, after an unsuccessful attempt by Mr. MAIDMENT to censure the Executive for the abandonment of the attempt to form an 'Acting Committee.' Questions respecting the case of Mr. Prust were answered, and Mr. WILLIAMS (Liverpool) suggested that an effort should be made to interest the London daily papers in the work of the Union.

Mr. GREENWOOD (Treasurer) moved the adoption of his report and of the annual balance-sheet. The total receipts for the year amounted to £2,049 17s. 2d., and the expenditure to £1,984 8s. 7d., leaving £24 1s. 5d. to pay the debt to Reserve Fund at the end of 1881, and carrying forward to 1883 a sum of £41 3s. 2d. The Reserve Fund now amounts to £262 3s. 6d. The report was adopted, as was also that of the auditors. The motion was then carried. Thanks were given to the auditors, who were re-appointed for another year.

Votes of thanks were then passed to 'The Officers,' 'The Executive,' and 'The Standing and Special Committees.'

SECOND SESSION—TUESDAY, MARCH 27TH.

The Second Session commenced at 9.30 a.m. on Easter Tuesday, when the poll for the election of officers was taken during the first hour. While this was proceeding a paper was read by Mr. Clarkson on

CORPORAL PUNISHMENT IN SCHOOLS.

The paper opened with a statement that any opinion expressed on the subject by a teacher was liable to much misconception. The writer contended that the public erroneously supposed that there was an undue amount of corporal punishment in elementary schools, a supposition he stoutly denied. Sentimentalists, in the pulpit, in the press, and on the platform, had joined the 'new crusade;' but the grand failure of these sagacious reformers consisted in this—they substituted nothing tangible for that they wish to remove. He then goes on to say that—

It will, I think, be acknowledged that all government rests ultimately on the principle of force, whether it be in the government of the country or of the school; and no one will take the ground that communities of men can be controlled without resort to punishments, and these often of great severity. A school is an undeveloped social community, where can be discovered all the traits, passions, and motives that govern the race, and which are to be controlled in the same way as in a larger community. Very few estimate how much our reputation as an order-loving, law-abiding community is due to the habits of obedience to law and self-restraint acquired in the schoolroom. The government of the school is exactly similar to that of the country—it rests ultimately on the principle of force. I, therefore, unhesitatingly say that punishment at school is, at times, an absolute necessity.

Mr. Clarkson entered fully into the consideration of what offences merit corporal punishment, and for what offence teachers as such should be called upon to inflict punishment. Good school arrangements and materials and a good staff will reduce the necessity for punishment, and school managers should do their duty in these respects. The experience of the Finchley School Branch was related at length, and, according to Mr. Clarkson, the attempt made in this Board to abolish corporal punishment proved a disastrous failure.

The conclusion of the paper is as follows:—

I have spoken of the glorious uncertainty of the law, or rather the capricious decisions of magistrates on the question of corporal punishment, and it behoves us to be prepared. We know not who may be prosecuted next, and he would be a bold prophet indeed who could, with any degree of certainty, predict the result of any such summons. What are we to do? Are we to protest? I don't care for platonic demonstrations. Let our motto be *semper paratus*. You have a Union which should give you defence and protection; and you have an Executive desirous of doing what it can in this direction, but is crippled for funds, and you must, I think, seriously consider whether the time has not come when legal defence, if necessary, should be at the disposal of every member of the National Union of Elementary Teachers.

In conclusion, I have only to say that in claiming the right to inflict corporal punishment in moderation we do so in the best interests of the children who attend the public elementary schools in which we are engaged. We claim it as one of the best means at our command, in a spirit of kindliness to the pupils themselves, to restrain them from evil-doing, and to remind them that 'order is heaven's first law,' and to impress upon them the conviction that obedience to orders in one of the most effective preparations for a useful and successful career in after-life.

Mr. CLARKSON then moved, and Mr. TATTERSALL (Birkenhead), seconded—

'That this Conference is of opinion that the sentimental objections raised by public speakers and writers to the legitimate use of corporal punishment in schools is subversive of discipline and injurious to the best interests of the children.'

After an interesting discussion, the motion was carried unanimously, as was also a vote of thanks to Mr. Clarkson for his paper.

Mr. RANKILOR (Birmingham) moved, and Mr. MORGAN (Westminster) seconded the following resolution:—

'That in the opinion of this Conference, paragraph 35 of the Instructions to Inspectors is unnecessary, and must prove injurious to school discipline.'

Both speakers maintained the necessity of using corporal punishment, while Mr. Tait (Huddersfield) suggested that the Department should be asked to withdraw the paragraph. Mr. Grove supported this view, and spoke strongly in favour of the motion. Mr. Greenwood was opposed to going to the Department. The motion as amended was agreed to.

SCOTCH DEPUTATION.

A deputation from the Educational Institute of Scotland, consisting of the President, Mr. A. Ramage (Rector of the Free Church Training College, Aberdeen), and Mr.

Young (Rector of the High School, Dalkeith), was then introduced, and addressed the Conference. The remarks of the Scotch representatives were well received, and a very hearty reception was accorded to them. Excellent speeches were made by both gentlemen, and a vote of thanks was accorded them for their presence and addresses.

ELECTION OF OFFICERS.

At this stage the result of the poll for officers was declared, from which it appeared that Mr. Greenwood was elected Vice-President by an almost unanimous vote, and that Mr. Wild was chosen General Treasurer by a large majority. Both gentlemen returned thanks, and expressed their intention to merit the trust reposed in them. The Second Session then closed.

THE NEWCASTLE PURSE SCHEME.—PRESENTATION OF PURSES.

At one o'clock the Conference-room was filled to overflowing by an interested audience assembled to witness the presentation of purses in aid of the Benevolent Fund of the Union, and to listen to the eloquence of several local magnates. Mr. Dawson took the chair, and the purses were 'received' by J. Cowen, Esq., M.P., senior Member for Newcastle. The platform was occupied by Dr. Bruce, Dr. Rutherford, Mr. Luckley (Chairman of the School Board), and other gentlemen. At the close of the reception, Mr. Cowen gave an eloquent and thoughtful address, every line of which is worthy of attention.

He said the duty imposed upon him had been an agreeable and not very onerous one. He was much struck with the large area from which the contributions had come, as well as by the weight of some of the purses. It was further gratifying to himself, and his distinguished townsman, Dr. Bruce, to see the schoolmasters of the country so numerous and so public-spirited. He supposed he was expected to say a few words, and he congratulated them upon the success of their Union. He then pointed out that combination was the order of the day, and that as Mr. Bowden had said the calling of the teacher was not only onerous but unhealthy. Giving some of the more recent statistics relating to school and school attendance, he proceeded to argue that although salaries had improved, they were yet inadequate to the public services rendered by teachers. A great change had been produced by the Education Act of 1870, though that Act had its deficiencies and disadvantages. A silent but substantial social revolution was going forward. Attendance was not yet enforced, and he was sure a practical people would not allow the excellent machinery of education which had now been provided to lie wasting and unused. They were all against extravagance and waste, but no money was better invested than that which was spent in educating the people. It was capital sunk which yielded a bountiful interest. The principal, too, would come back easily and soon, in a wiser, stronger, healthier population. Then what was the case of the teacher. Beset with the cares of the world; depressed with monetary and domestic difficulties, and worried by the necessary troubles of his profession. It was impossible for such a man to give his best services to his pupils. In the interest of all it was necessary that the teachers should be placed beyond anxiety, and in a position of reasonable comfort and independence. He did not ask for extravagance. It was not what a man possessed, but what he was, that made him happy. But he required adequate supply of necessaries and comforts, and these were all he was contending for. The rest the teachers must supply themselves. The creators of our national wealth and strength and vigour ought at least to be put into that position. That was another point in the educational arrangements that required their attention. If he might detain them longer—not in disparagement but in criticism of their system, it would be this—that he thought it was too monotonous. It struck him that there was a want of diversity about it. It was too uniform, too much bound down by rules and inspections. They had too many new Codes. They should leave more to the teacher; trust more to spontaneity, and less to cold and bald regulations. (Applause.) If the schoolmaster had his heart in his work, he did not require all those prescriptions. But he feared that it was in accordance with too prevalent ideas at the present to cut them all down to one common pattern. This was not desirable; but it had penetrated into all kinds of life, politics, sociology, and commerce. They wanted to make them all of a certain pattern—a sort of Western Chinese. (Laughter.) For his part, he resented the idea. Diversities were much more picturesque. Differences of opinion lent a pleasing tone to existence. But, apart from that, this uniformity brought weakness. Diversity gave strength. He remembered a distinguished American saying—and he was struck with the remark—that America was the best common school country in the world, and one of the worst educated. It was a strong remark, but it conveyed a suggestive meaning. They systematised and uniformatised to such an extent that there was a tendency, at least in the population, to make them all one size. They might as well try to make them all of one obesity or of one complexion. (Laughter.) It would not succeed, but notwithstanding the effort made was dispiriting. He thought that was one of the blemishes of their educational system. He trusted that they would have it modified in future. The chief function of a statesman was to watch over the externals of life; but the duty of an educator was to quicken its soul, stimulate its intellect. The statesman studied to manipulate and manage the passions and prejudices of the community. The educator strove to control the loftiest and noblest faculties of human nature. The politician had often to work with coarse instruments for coarse ends. The educator worked with the most refined influences for the loftiest purposes, the noblest that could nerve men's energies or rouse their spirits. (Loud applause.)

Dr. BRUCE said he felt a deep interest in the work of the Union, in the labours of the members of which the whole family of mankind was interested. The teacher had not merely to write facts on the memories of his pupils, but to teach them to teach themselves. He wished them well in all their efforts. He trusted that their emoluments would continue to increase, and that they would soon be delivered from some of the worries with which they were now perplexed. (Applause.)

The SECRETARY (Mr. Heller) read the following telegram which had been received from Mrs. Mundella in reply to the telegram sent to the Conference on the previous evening:—'My husband begs you will convey to the Conference his warmest thanks for its kind expression of sympathy with him. He heartily wishes it success, and congratulates the President on his able address. The doctor's report is again favourable.' (Cheers.)

Dr. RUTHERFORD, in a few eloquent words, hoped that all had been cheered by the day's proceedings, and that one result of the Conference would be the adoption of a less mechanical system of inspection than was now often witnessed. A vote of thanks was given to Mr. Cowen, who, in his reply, paid a high compliment to Mr. Mundella, and said he would inform the Vice-President of the good feelings with which they had received the intimation of his improved health. The sum collected was announced as £1,573, and the Secretary announced that Mr. Cowen had generously handed in a cheque for £37 to make the total £1,600.

WEDNESDAY, MARCH 28TH.

At eight o'clock on Wednesday morning a large number of the members of Conference accepted the invitation to a Temperance League breakfast. Professor Harley, F.R.S. (Principal of Huddersfield College), presided. Addresses were delivered by the Chairman, the Rev. Canon Lloyd, Messrs. Barkas, Spence, and others. A vote of thanks to the National Temperance League and to Professor Harley was moved by Mr. Dawson, President of the N.U.E.T., and seconded by Mr. Heller, General Secretary.

The Third Session of Conference commenced at 10 a.m. with a paper on 'The Manchester Scheme,' by Mr. Elliott, of St. Philip's School, Manchester. The scheme was one for remodelling the Union on a wider basis, and for raising the subscription so as cover the personal contributions of members to the Benevolent and Orphanage Funds, and to place a larger fund at the disposal of the Executive for professional purposes. The paper was, after the manner of 'papers,' very long, and being written in an involved and intricate style, was at times somewhat impatiently listened to. It was, nevertheless, an able exposition of the views of the 'Manchester Men' on the subject. A vote of thanks to Mr. Elliott having been agreed to, Mr. J. THORNTON, M.A. (Manchester), moved and Mr. SOUTH seconded:

'That the subscription of members of the N.U.E.T. shall in future include not only adequate provision for professional objects, but also for the temporary and permanent relief of members.'

An amendment was moved by Mr. E. Wilkes Smith, and seconded by Mr. Hilton, in the following terms:—

'That the subscription of members of the N.U.E.T. shall in future include provision for professional objects only.'

A long and interesting debate followed, in which Messrs. E. W. Moore, M.A., Williams (Liverpool), Abbott (Sheffield), Langler, B.A., Collins, Grove, Wardall, took part. A show of hands was taken, when the amendment was carried by eighty votes to fifty-seven.

IRISH DEPUTATION.

At this stage, the deputies from the Irish National Teachers' Organisation arrived, and were enthusiastically received. The deputation consisted of the President (Mr. C. M. Cullen) and the Vice-President (Mr. Nealon) of the Organisation. Both deputies delivered interesting addresses, for which they received the thanks of Conference. The debate on the Manchester Scheme was then adjourned.

FOURTH SESSION.—WEDNESDAY AFTERNOON.

On the resumption of the debate Mr. COLLINS moved the following amendment to the motion of Mr. Wilkes Smith :—

'That, in the opinion of this Conference, it is expedient that the subscription to the N. U. E. T. be sufficient to provide for (*a*) the legal assistance of any of its members who, in the judgment of the local association to which they belong, and of the Executive, are involved in cases affecting the rights and interests of teachers; and (*b*) the support of any teachers who, in the opinion of the Executive may have suffered injury through any legitimate action they may have taken in defence of professional objects. 2. That the Executive be instructed to revise the rules of the Union so as to give effect to the foregoing resolution.'

The debate turned practically upon the advisability of establishing a Legal Defence Fund, and the proposal secured considerable support. Mr. GIRLING seconded the amendment, which was also supported by Dr. Ever, Messrs. Abbott, Scotson, Moore, and Hellen. A modified opposition was raised by Mr. Williams of Liverpool, and supported by Messrs. Taylor, G. M. Smith, Hilton, etc. Mr. E. W. Smith was then allowed to withdraw his motion in favour of Mr. Collins' amendment, which then became the substantive motion. Mr. Heller suggested some verbal alterations, which were adopted, and the motion was then unanimously adopted.

THE CODE.

Mr. GROVE moved, and Mr. HILTON seconded the reception of the Special Report of the Code Committee. Mr. Grove said the country had forgotten, or were ignorant of the actual work of the Union, in respect of the Code. Mr. Mundella had stated that the Code was intended to give the teacher greater liberty, and ensure better education. This can only be done by teachers refraining from presenting all the children who may have attended the requisite period.

Mr. HELLER rejoiced that the requirements in needlework had, by the efforts of the Union, been reduced to more reasonable limits, and he hoped the circular to members issued by the Executive would be carefully read and acted upon.

Mr. GROVE moved on behalf of the Executive the following resolution :—

'That this Conference hereby expresses its strong disapproval of the practice adopted by some teachers of keeping children in after school hours, for the purpose of making special preparations for examinations, thereby bringing injurious pressure to bear on dull and weakly children, and creating in the minds of Inspectors a false standard respecting the ordinary work of the school; and the Conference calls upon the local associations to use every effort to stop this pernicious practice.'

A long discussion on 'overpressure' and 'overtime' followed, during which Mr. Clarkson attempted to amend the resolution by inserting words attributing overpressure to the 'excessive requirements of the Mundella Code, and the great irregularity of attendance.' This was lost by forty votes to seventy. A further amendment asking the Educational Department to stop the practice of 'overtime' was put forward by Mr. Kirbey of Macclesfield, and ultimately accepted by Mr. Grove and adopted. During the discussion strong objections were expressed by many experienced members of conference to the principle of Mr. Kirbey's amendment.

ELECTION OF EXECUTIVE.

At this point the Scrutineers handed in the results of the polls for the election of the Executive, and for the place of next Conference. All the retiring members who sought re-election were successful, and five new members were elected, viz., Messrs. Abbott, Whitworth, Webb, Philpott, and Collins. Leicester was chosen as the place of next Conference.

MEDICAL INSPECTION OF SCHOOLS.

Mr. SHAW (Wolverhampton) moved and Mr. GURNER (Westminster) seconded :—

'That the attention of Conference be directed to the influence of the new Codes on the health of the teachers and scholars in our elementary schools, and that the Conference suggests the appointment of medical inspectors of schools.'

The previous question was then moved and carried.

FIFTH SESSION—THURSDAY MORNING.

The subject of Pensions was the first discussed at the Fifth Session.

In the absence of Mr. Grove, who has made this question his own,

Mr. WELCH (Eastbourne) moved the following resolution :—

'That this Conference regrets that teachers who have *fulfilled the conditions* of the Minutes of 1864 and 1851, relating to pensions, have been refused pensions on the ground that the amount at the disposal of the Department has been exhausted, and calls upon the associations throughout the country to interview the members of Parliament with a view to having the amount unexpended during the years the Pension Minutes were in abeyance, made available for satisfying these just claims upon the public exchequer, and instructs the Executive to immediately take such further steps as may be necessary to bring the case of these teachers before the public.'

Mr. GROVE seconded, and after a short discussion the motion was carried.

COMPULSORY ANNUITY FUND.

Mr. GIRLING brought up a special report on this subject and moved its reception. The report contained a history of the efforts of the Union in this matter, a summary of the various proposals submitted to the Committee, and a statement of opinion by the Committee. Several general resolutions were submitted in order to test the feeling of Conference on the policy of agitating for a Compulsory Annuity Fund. The report was then received, after several members had questioned the wisdom of asking for a Compulsory Fund.

Mr. GIRLING then moved, 'That it is desirable that a General Compulsory Annuity Fund be established for the Elementary Teachers of England and Wales.' Mr. AVERILL (Jarrow) seconded.

An animated discussion followed, during which the SECRETARY (Mr. Heller) said that the question was a very important one, and one not generally understood. There was no doubt that means should be provided for the support of teachers in old age. If a general scheme was to be prepared to which teachers only should contribute, a subscription very much in excess of £1 or £1 10s. per annum was needed. There were many teachers at present who could not afford to pay the necessary amount without assistance. Let the teachers look the matter fairly in the face, and know exactly what they were doing.

Mr. ABBOTT (Sheffield) moved and Mr. WELCH (Eastbourne) seconded the following amendment :—

'That the special report of the Parliamentary and Law Committee on a compulsory annuity scheme should be remitted at

an early date, with any additions considered advisable by the Executive, to the local associations for their consideration; and that the Executive report to the next Conference.'

After further discussion, in which Messrs. G. M. SMITH, HEAP, GRAY, MAIDMENT, BUTLAND, and others took part, the amendment was lost. The original motion was carried by 34 votes to 50. A poll was thereupon demanded, which resulted in 2,975 votes for the motion, and 2,536 against it, being thus carried by a majority of 439 votes.

SCHOOL ATTENDANCE.

The next business was the reading of a paper on 'School Attendance' by Mr. T. E. HELLER, the General Secretary. The paper dealt with the subject in an attractive manner, and was full of special information, the writer setting himself the following task:—

'(1) To give a brief statement of the law respecting school attendance; (2) to criticise the bye-laws; (3) to describe the machinery by which the law is enforced; (4) to examine the work of the local authorities and magistrates in reference to compulsory attendance at school; (5) to note the action of the Education Department and Home Office in enforcing the law; (6) to trace the educational and pecuniary results of good attendance at school; and (7) to make some suggestions for the amendment of the law and the improvement of its administration.'

These points were well handled, and we regret that the space at our disposal will not permit us to quote more freely from this interesting paper.

After a vote of thanks to Mr. Heller, the following resolution was, on his motion, adopted:—

'That in the opinion of this Conference the administration of the law respecting compulsory attendance at school is uncertain and generally unsatisfactory; that the local authorities and magistrates are in many instances grossly neglectful of the duties imposed upon them by law; and that additional facilities should be afforded in many town and country districts for the hearing of cases.'

VOTES OF THANKS.

Votes of thanks were then passed to the local associations and to the Local Conference Committee for their arrangements, to the Purse Scheme Committee, to Mr. Cowen, M.P., and other inhabitants of Newcastle, to the Scrutineers, to the Conference sub-committees, to the Press, to the President, and to the Committee of the Literary and Philosophical Institution.

The Reports on 'School Attendance,' 'Representation in Parliament,' and 'Constitution and Election of the Executive,' were then on the motion of the Secretary formally received, after which the President declared all other business on the agenda to be 'dropped,' and that the Conference was closed.

CONFERENCE DINNER AND BALL.

The Conference dinner was held on Tuesday evening in the Assembly Rooms, when about 230 persons sat down to a well-served repast. The usual toasts were proposed and duly honoured, eliciting speeches from Mr. Spence Watson, Mr. Luckley, Mr. France, the Revs. J. Bee and Tasker, and other leading men on Tyneside. The ball was held in the same building on Wednesday evening, and was a complete success, being attended by about 250 persons. The arrangements, music, and refreshments were excellent.

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